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Marine Fisheries Abstracts

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UNITED STATES DEPARTMENT OF COMMERCE

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NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

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NATIONAL MARINE FISHERIES SERVICE

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FOREWORD

The Department of Commerce's National Marine Fisheries Service publishes the monthly journal *Marine Fisheries Abstracts* as one means of communicating to the fishing industry and allied groups the status of current fishery research. The research includes the biological aspects of fishery science as well as technological studies dealing with aquatic resource supply, harvesting, processing, utilization, and distribution.

Marine Fisheries Abstracts contains summaries of selected articles from trade, engineering, and scientific journals dealing with the entire spectrum of fishery science. The publication is designed to serve the needs of fishery scientists, engineers, and managers in industry, academic institutions, and government by supplying timely information on current progress in fishery research and technology.

0.35 NATURAL INHIBITORS OF NITROSATION REACTIONS: THE CONCEPT OF AVAILABLE NITRITE

Fan, T. Y., and S. R. Tannenbaum (Dept. of Nutrition & Food Science, Massachusetts Institute of Technology, Cambridge, MA 02139)
Journal of Food Science 38, No. 6, 1067-1069 (Sept.-Oct. 1973)

Nitrosamines can be formed in food products if the level of nitrite and nitrosable amine are high enought and conditions are appropriate. However, earlier work has shown that ascorbic acid, sodium ascorbate, or sodium isoascorbate can block the nitrosation reaction by reacting with nitrite. This paper presents information on the effect of ascorbic acid on the formation of nitrosomorpholine (a weakly basic amine) in a model system. Various concentration ratios of ascorbic acid to nitrite were used to test the effect of ascorbic acid on the formation of nitrosomorpholine at pH 4 and 25° C.

Ascorbic acid appears to act as a blocking agent for the formation of N-nitroso compounds (this confirms similar observations by previous researchers). The rate of nitrosation of morpholine also proceeded more slowly in certain foods (milk) and in the model ascorbic acid system than in buffer at the same temperature (25° C) and pH (6). It seems likely that nitrite may be bound in several complex forms in foods and not all of it is available for nitrosation of amines, but some of it can be measured as nitrite by the Griess reaction.
[1 figure, 2 tables, 18 references] FTP

0.322 PATTERNS OF NINHYDRIN-POSITIVE SUBSTANCES IN THE MUSCLE TISSUE OF BONY FISH

Partmann, W., and H. Schlaszus (Bundesforschungsanst. Lebensmittelfrischhalt., Karlsruhe, Germany)
Chemical Abstracts 79, No. 9, 50831y (Sept. 3, 1973)

0.39 SODIUM EXTRUSION BY A FISH ACCLIMATED TO SEA WATER.
(0.38) PHYSIOLOGICAL AND BIOCHEMICAL DESCRIPTION OF A SODIUM-FOR-POTASSIUM EXCHANGE SYSTEM

Evans, David H., Charles H. Mallery, and Larry Kravitz (Dep. Biol., Univ. Miami, Coral Gables, Fla.)
Chemical Abstracts 79, No. 13, 76112q (Oct. 1, 1973)

0.35 (3.15)(6.54) DIFFERENCES IN SARCOPLASMIC AND FIBRILLAR PROTEINS OF BOMBAY DUCK (HARPODON NEHEREUS) TO HEAT AND RADIATION INDUCED DENATURATION

Warrier, S. B. K., V. Ninjoor, P. L. Sawant, and U. S. Kumta (Biochemistry and Food Technology Division, Bhabha Atomic Research Centre, Trombay, Bombay 85, India)
Journal of Food Technology 8, No. 3, 283-293 (Sept. 1973)

Differences in the response of sarcoplasmic and fibrillar proteins, isolated from the fish Bombay duck, to denaturation effects caused by treatments of heat and/or irradiation are described. The physicochemical changes were evaluated in terms of precipitability of the muscle proteins, rates of tryptic hydrolysis, gel filtration properties, and migration patterns in gel electrophoresis. The ultimate objective was to determine the optimum conditions of combination treatments for the isolation of fish protein concentrate based on the precipitation of the fibrillar proteins. Optimum conditions of treatment for the maximum precipitation of fibrillar protein were a radiation dose of 0.55 Mrad and heating for 10 min at 60° C. This treatment resulted in 83% precipitation of the fibrillar protein fraction with no visible precipitation of the sarcoplasmic protein fraction. The sarcoplasmic proteins denatured by irradiation or heat treatment showed an increased rate of tryptic hydrolysis and alterations in the pattern of Sephadex gel filtration and polyacrylamide gel electrophoresis. The fibrillar proteins showed no change in their susceptibility to trypsin. The authors indicate that these results provide a basis for the development of a new method for preparing fish protein concentrate.
[5 figures, 1 illustration, 2 tables, 20 references] FTP

0.38 ORNITHINE AMINOTRANSFERASE OF FISHES

Wekell, Marleen M. B., and G. W. Brown, Jr. (College of Fisheries, University of Washington, Seattle, WA 98195)
Comparative Biochemistry and Physiology 46, No. 4B, 779-795 (Dec. 5, 1973)

The enzyme ornithine aminotransferase in fish is similar to the mammalian enzyme. It catalyzes the transfer of the delta amino group of ornithine to a keto acid. Additionally, in mammals, the enzyme is part of the ornithin-urea cycle involved in the conversion of the reduced nitrogen in amino acids to urea. In the ratfish and spiny dogfish, which have a functioning ornithine-urea cycle, the enzyme levels were lower than those determined for teleosts. Teleosts do not have an ornithine-urea cycle; instead, they excrete excess nitrogen as ammonia in the gills as established by H. J. Smith [J. Biol. Chem. 81, 727-732 (1929)], J. D. Wood [Can. J. Biochem. Physiol. 36, 1237-1242 (1958)], and P. O. Fromm [Comp. Biochem. Physiol. 10, 121-128 (1963)].

The enzyme was found in the liver of salmonids, flatfish, striped sea perch, ratfish, and spiny dogfish. The enzyme activity was higher in the livers of some fish, and higher in the kidney of other fish. In addition, liver enzyme levels of chinook salmon parr were higher than those found in spawners. The levels of the enzyme in liver decreased in starved dogfish and English sole. This information may be useful in determining the nutritional state of fishes. The enzyme activity was inhibited by heavy metals, especially mercury. This is attributed to four cysteine residues in the enzyme molecule; the SH groups in the cysteine residues having bound the mercury.
[4 figures, 5 tables, 48 references] SW

0.35 USE OF SODIUM ASCORBATE OR ERYTHORBATE TO INHIBIT FORMATION OF N-NITROSODIMETHYLAMINE IN FRANKFURTERS

Fiddler, W., J. W. Pensabene, E. G. Piotrowski, R. C. Doerr, and A. E. Wasserman (Eastern Regional Research Center, ARS, U.S. Dept. of Agriculture, Philadelphia, PA 19118)
Journal of Food Science 38, No. 6, 1084 (Sept.-Oct. 1973)

Earlier work in the authors' laboratory demonstrated the presence of dimethylnitrosamine in 3 of 40 commercial samples of frankfurters. In the present study, the effect of sodium nitrate, sodium ascorbate, and sodium erythorbate on the formation of dimethylnitrosamine in frankfurters was examined. Frankfurters were prepared in the conventional manner using a 2-h smoking and heating schedule that brought the temperature of the frankfurters to 71° C. In addition, some of the frankfurters were smoked and heated for 2 more hours (to maintain the frankfurters at 71° C) to assess the effect of extreme processing conditions on the formation of N-nitrosodimethylamine. The frankfurter formulations contained 150 p/m of sodium nitrite (the maximum permissible amount) or 1,500 p/m (10 times the permissible amount). Sodium nitrate, sodium ascorbate, and sodium erythorbate were added to the formulation at their maximum permissible levels (1,700, 550, and 550 p/m, respectively), or at 10 times those amounts.

Frankfurters prepared with 150 p/m of sodium nitrite, alone, or with sodium nitrate, sodium ascorbate, or sodium erythorbate had no N-nitrosodimethylamine. Addition of 1,500 p/m of sodium nitrite induced the formation of N-nitrosodimethylamine in the frankfurters, but sodium nitrate had no effect; however, addition of sodium ascorbate or sodium erythorbate prevented the formation of N-nitrosodimethylamine in frankfurters processed for 2 h and reduced the amount formed in those processed for 4 h.
[1 table, 6 references] FTP

0.35 (2.00) INTERACTION OF FORMALDEHYDE WITH FISH MUSCLE IN VITRO

Childs, E. A. (Seafoods Laboratory, Dept. of Food Science & Technology, Oregon State University, Astoria, OR 97103)
Journal of Food Science 38, No. 6, 1009-1011 (Sept.-Oct. 1973)

Stored frozen fish muscle shows a progressive decrease in extractable whole myofibrils and in the amount of protein extractable in high ionic strength salt solutions. In some species of fish, trimethylamine is reduced to form formaldehyde which may cause a decrease in the amount of protein soluble in 0.50 μ saline solutions. Thus, formaldehyde may be involved in the myofibril insolubilization in fish muscle. The present study was carried out to examine the interaction of formaldehyde with fish muscle myofibrils and their constituent proteins. The muscle of the Pacific true cod (Gadus macrocephalus) was used in these experiments. The fresh fish were filleted and the fillets were frozen in blocks at -40° C. The frozen blocks were cut in portions, and the portions were vacuum packed in moisture-vaporproof film and held at -40° C and analyzed initially and after 3 and 6 months of storage. [μ = ion strength of a solution. Abstractor's note]

Exposure of fresh and frozen Pacific true cod muscle to formaldehyde caused a reduction in the amount of extractable salt-soluble proteins. Tropomyosin and the heavy chains of myosin were most easily insolubilized; actin and the 37,400 molecular weight component were least reactive. Exposure to formaldehyde also decreased the amount of extractable whole myofibrils in the fresh and frozen stored fish muscle. As determined by sodium dodecyl sulfate-acrylamide gel electrophoresis, whole myofibrils extracted in the presence of formaldehyde had complete protein complements.
[4 figures, 10 references] FTP

0.39 (4.92) INFLUENCE OF OXIDIZED LIPIDS ON THE LIVING BODY. II. THE INFLUENCE OF METHYL DOCOSAHEXAENOIC ACID HYDROPEROXIDE UPON RAT ORGANOLIPIDS

Ogawa, Akira (Japan Frozen Foods Inspection Corporation, Kōbe Inspection Station, Japan), and Hisanao Igarashi
Bulletin of the Faculty of Fisheries, Hokkaido University, Hakodate, Japan 23, No. 4, 191-203 (May 1973) (In Japanese, English abstract)

Toxicity to the liver of rats, after long-term ingestion of docosahexaenoic acid hydroperoxide, was investigated. Groups of rats were administered either purified soy bean oil (the control group), or unoxidized methyl docosahexaenoate (D), or methyl docosahexaenoate hydroperoxide (DH) for 13 weeks. In comparison to the control group, weight gain of rats given D began to decline in 5 weeks, and the weight gain of rats given DH began to decline in 3 weeks.

Histological examination of the rats given DH indicated hypertrophy of the liver and kidney. Compared to the control group the TBA value increased in lipids of the liver, spleen, stomach, and intestines of the DH group; however, the total lipid content of the liver decreased in the DH group. In addition, linoleic and arachidonic acid decreased and docosahexaenoic acid increased in the phospholipids of the livers of the D and DH groups. In the blood serum of the D and DH groups total lipid, phospholipid, and cholesterol contents decreased. The authors concluded that long-term ingestion of DH had a deleterious influence on the synthesis of lipids in the livers of rats.
[4 figures, 10 tables, 7 references] SW

0.39 (1.89) POSSIBLE MECHANISM OF REGULATION OF MEDIATOR FUNCTIONS IN PROCESSES OF PRENERVOUS EMBRYOGENESIS

Buznikov, G. A., N. D. Zvezdina, L. N. Markova, L. V. Sorokin, and T. M. Turpaev (Inst. Dev. Biol., Moscow, U.S.S.R.)
Chemical Abstracts 79, No. 15, 89704j (Oct. 15, 1973)

0.39 (0.4) BLOOD HEMOGLOBIN LEVELS AND TOTAL SERUM PROTEIN IN DIFFERENT PERIODS OF THE ANNUAL CYCLE OF CHALCALBURNUS CHAL, AND BREAM IN AZERBAIJAN

Dzhabarov, M. I., and M. A. Mekhtiev (U.S.S.R.)
Chemical Abstracts 79, No. 13, 76091g (Oct. 1, 1973)

0.4 SYMPOSIUM. PHYSIOLOGICAL EFFECTS OF NOISE

Welch, Bruce L. (Symposium chairman)
Federation Proceedings 32, No. 11, 2091 ff. (Nov. 1973)

A symposium was presented at the meeting of the American Physiological Society on Aug. 29, 1972, in University Park, Pa. In the first paper, "An Overview," by Bruce L. Welch (pp. 2091-2092) the author reviews the papers presented at the symposium and adds some comments of his own. The research reported at the symposium emphasizes (a) that environmental sound has all-pervasive effects on the body and influences every organ system and function that has been studied; and (2) that important physiological and structural effects of sound continue after the initial stimulus has ended. Noise is defined by C. M. Harris [Handbook of Noise Control. McGraw-Hill, New York (1957)] as "unwanted sound" with recommendations of minimizing its adverse effects by the use of "masking noise." The author prefers his own definition of noise as "audible sound that may be harmful to health."

Two papers in the symposium showed the ability of repeated auditory stimulation to alter calcium metabolism and influence embryonic skeletal development. [These papers are "Hypertensive Effects of Prolonged Auditory Visual and Motion Stimulation" by H. H. Smookler, K. H. Goebel, M. I. Siegel, and D. E. Clarke (p. 2105), and "Inhibition of Fetal Osteogenesis by Maternal Noise Stress," by W. F. Geber.] Another report described the neurochemical effects of sound, ["Azure B-RNA Changes in the Adrenal and Cerebral Cortex of Rats Exposed to Intense Noise," by A. Anthony (p. 2093).] K. R. Henry described the phenomenon of acoustic "priming" in mice exposed to a 90-dB sound for 5-30 sec during a critical period in the their early development. They subsequently had an elevated absolute auditory

0.5 (1.36) THE BACTERIAL FLORA OF THE ATLANTIC SALMON (SALMO SALAR L.) IN RELATION TO ITS ENVIRONMENT

Horsely, R. W. (Dept. of Trade and Industry, Torry Research Station, 135 Abbey Road, Torry, Aberdeen, Scotland)
Journal of Applied Bacteriology 36, No. 3, 377-386 (Sept. 1973)

Conservation, aquaculture, and food processing of the Atlantic salmon requires an understanding of the microflora associated with the fish and its environment. Salmon were taken at one coastal location, one estuarine area, and in their migratory route, at two lowland locations and three upland spawning grounds. The microflora of the skin and gills were analyzed, and the water at each location was also analyzed.

The principal groups of bacteria on the skin and gills were identified as coryneform organisms; species of Moraxella, Flavobacterium, Cytophaga, Pseudomonas, Acinetobacter, Bacillus; and members of the Micrococcaceae and Enterobacteriaceae. Of the flora found on fish from the coastal waters, Moraxella, Flavobacterium, Cytophaga, coryneform, and Micrococcaceae groups comprised 32, 15, 25, and 14%, respectively, of the total flora; the same bacterial groups found on fish taken from the spawning grounds comprised 8, 28, 20, and 10% of the total flora. The count of organisms found on the skin were similar to those found in the water environment of the fish at each sampling location. The bacterial groups in the water were similar to the those found on the skin and gills of the salmon. [4 figures, 3 tables, 29 references] SW

0.6 (0.8) BP PROTEINS LTD. PROTEINS FROM HYDROCARBONS

Anonymous
Chemical Engineering 80, No. 27, 62-67 (Nov. 26, 1973)

A British firm was awarded top honors for the most important chemical-engineering development commercialized during the past 2 years. Two separate processes for cultivating a high-protein-content yeast on normal paraffins were developed. This industrial scale production of protein from hydrocarbons is especially important in view of the world food situation.

Yeasts have been grown on carbohydrate-containing waste liquids such as those from sugar refining and sulfite pulping. However, the amount of yeast that can be harvested by this process is limited by various factors including the volume of wastes available and the economic restrictions of collecting them. Use of hydrocarbons for the production of yeasts eliminates these two shortcomings but does involve other large obstacles. The carbohydrate-containing substrates provide carbon, hydrogen, and oxygen for yeast cell growth in an aqueous solution; furthermore other essential elements can be easily added. The hydrocarbon medium, on the otherhand, furnishes only carbon and hydrogen in a form practically insoluble in water. In this process, then, large quantities of atmospheric air must be introduced with intensive mixing (so that the yeast makes contact with both water-soluble and water-insoluble materials.) In the metabolic conversion of hydrocarbons to protein, carbon dioxide, water, and heat are released. The process of hydrocarbon assimilation requires about 2.5 times as much oxygen and liberates more

0.7 PRESENT KNOWLEDGE OF THE RELATIONSHIP OF NUTRITION TO BRAIN DEVELOPMENT AND BEHAVIOR

Anonymous
Nutrition Reviews 31, No. 8, 242-246 (Aug. 1973)

This article consists of excerpts of a position paper published by the Food and Nutrition Board of the National Academy of Sciences-National Research Council. The complete paper is available from the Food and Nutrition Board, NAS-NRC, 2101 Constitution Ave., N.W., Washington, DC 20418.

The development of the brain, and consequent behavior, of all higher animals evolves from the interaction of genetic and environmental factors. Nutrition is one of the factors concerned directly with providing for energy, cellular structures, and metabolic systems necessary for development. A good environment includes adequate nutrition; however, malnutrition may occur either in a good environment or in a poor environment where other factors may also limit an individual's development. When malnutrition results from either inability to utilize nutrients or specific nutrient deficiencies the central nervous system is altered by limits on metabolic, structural, and functional capabilities. In contrast, malnutrition due to continual limitation of food intake may result in stunted growth, reduced brain size, and poor biochemical organization of the brain. These abnormalities may: (1) reduce learning abilities; (2) impair the developmental process by decreasing responsiveness to external stimuli when sequential experience must be acquired; and (3) disrupt the learning process by adverse behavioral changes in a child which may interfere with interpersonal experiences required for development.

0.5 (2.05)

GROWTH OF CLOSTRIDIUM PERFRINGENS IN FOOD PROTEINS PREVIOUSLY EXPOSED TO PROTEOLYTIC BACILLI

Schroeder, D. J., and F. F. Busta (Dept. of Food Science and Nutrition, University of Minnesota, St. Paul, MN 55101)
Applied Microbiology 26, No. 5, 675-681 (Nov. 1973)

Production of pasteurized fabricated foods under modern sanitary conditions can result in the destruction of common spoilage organisms and the leaving of sporeforming bacteria (that is, Clostridium sp. and Bacillus sp.). Earlier work has demonstrated that small amounts of hydrolyzed protein with soy proteins in synthetic meats stimulated the growth of C. perfringens. In the present study, the researchers determined the effects of prior growth of proteolytic B. subtilis in sodium caseinate and isolated soy protein on the growth of C. perfringens. B. subtilis A cells were cultured in 3% sodium caseinate or isolated soy protein solutions. The subsequent effect on the lag time and growth of C. perfringens was measured; no antagonistic effects on growth of C. perfringens were noted but the lag time of subsequent growth of the organism was reduced. This reduction in lag time caused by B. subtilis incubation was not related to a specific charge of the peptides nor to their amino-acid composition. It apparently resulted from the more ready availability of the hydrolyzed protein for utilization by C. perfringens.
[7 figures, 1 table, 15 references] FTP

0.7

In addition, persons suffering malnutrition who come in social contact with a child may be unable to provide the child with adequate learning experiences necessary for development. The subtleties of the interrelationships between nutrition and other environmental factors that influence brain development and behavior need to be further defined. In addition, the underlying mechanisms of brain development and behavior must be investigated to either prevent their derangement or improve the means of treatment. Major and continuing commitments of money and people to these basic research tasks will be required. SW

0.4

threshold but a lowered threshold for sound-induced seizures. [These results were reported in "Increased Adult Auditory Responsiveness Resulting From Juvenile Acoustic Experience" (p. 2098).] In the paper by M. F. Lockett and J. F. Marwood ["Sound Deprivation Causes Hypertension in Rats" (p. 2111)], rats that are genetically prone to hypertension were transferred to a well-ventilated, soundproof room where the ambient sounds originated only from the animals in the space. The results indicated that the development of systolic hypertension was accelerated. The elevated blood pressure was maintained for a 12-week period. Development of the hypertension was prevented by exposing the rats to ambient sound of about 75 dB from the normal rat colony.

The author believes that the most crucial question regarding environmental sound is, "Does the individual react to the sound with delight or indifference, or with resentment, hostility, annoyance, or fright"?
[12 references] SW

0.6 (0.8)

than twice as much heat (which must be removed) than the carbohydrate conversion process. The gas-oil process utilizes the waxy normal-paraffins present in a middle-distillate fraction of crude oil; the other process uses refined normal paraffins. The product of the conversion (trade name Toprina) is a cream-colored, odorless, tasteless mass of yeast cells. Currently it is being used as a constituent of animal feed. The product contains at least 60% crude protein and 8% or less of moisture. The remainder consists of lipid, ash, calcium, and phosphorus. The amino-acid distribution is similar to that of soya bean meal and fish meal, but it does have a slightly lower methionine content. The product is, however, richer in lysine than soya bean meal and fish meal. The biological availability of the amino acids in the product is about 92%. Feeding tests with laboratory and farm animals indicate that the product is safe.
[5 illustrations] FTP

0.6 (3.33)

PROTEIN RECOVERY FROM SOLUTIONS USED FOR WASHING MEAT OF BEEF AND FISH

Ohta, Saburo, and Kazuo Kudo (Nippon Kayaku Co., Ltd.) (pat.)
Japan. Kokai 73 48,662 (July 10, 1973)
Chemical Abstracts 79, No. 19, 114224n (Nov. 12, 1973)

0.6 (1.89)

PROTEIN-RICH FOODS WITH TEXTURE RESEMBLING SQUID MEAT

Fujita, Chuzo, Kenji Hayashi, Kuniaki Abe, and Toshio Ikemoto (Kyowa Fermentation Industry Co., Ltd.) (pat.)
Japan. Kokai 73 52,962 (July 25, 1973)
Chemical Abstracts 79, No. 19, 114214j (Nov. 12, 1973)

0.39 (6.32)

INTERRESIDUE LACTONES FORMED BY TREATMENT OF PERIODATE-OXIDIZED POLYSACCHARIDES WITH AQUEOUS BROMINE

Ishak, Mona F., and Terence Painter (Inst. Mar. Biochem., Nor. Tek. Hoegsk., Trondheim, Norway)
Chemical Abstracts 79, No. 15, 92502x (Oct. 15, 1973)

0.7 (8.5) POLYUNSATURATES AND FAT IN FISH FLESH

Stansby, Maurice E. (Pioneer Research Unit, Northwest Fisheries Center, National Marine Fisheries Service, NOAA, U.S. Dept. of Commerce, Seattle, WA 98102)
Journal of the American Dietetic Association 63, No. 6, 625-630 (Dec. 1973)

Data are given on the general protein and fat contents, and polyunsaturated fatty acid and docosahexaenoic acid contents, of various fish and fishery products. In the table that follows, some data on the polyunsaturated fatty acid and docosahexaenoic acid content of certain species of fish and their products are listed. Docosahexaenoic acid is highly unsaturated, containing 22 carbon atoms with six double bonds. Although its nutritional significance is yet not known, it occurs at relatively high levels in certain human tissues, including the brain and the central nervous system.

Fish may be included in the diet from at least three nutritional aspects: (1) as a source of several nutritional components, (2) as a low-fat, high-protein food, and (3) as a source of polyunsaturated fatty acids.

[2 tables, 6 references] FTP

0.8 [USE OF SECONDARY HEAT IN THE FOOD INDUSTRY]
ISPOL'ZOVANIE VTORICHNOGO TEPLA V PISHCHEVOI PROMYSHLENNOSTI

Stabnikov, V. N., and N. G. Boichenko
Pishchevaya Promyshlennost, Moscow, U.S.S.R. (1972), 151 pp. Price 0.53 ruble (In Russian)
Food Science and Technology Abstracts 5, No. 10, 17-18, Abstract No. 10E314 (Oct. 1973)

This book contains chapters on the following subjects: secondary energy sources (pp. 4-15); evaporation of solutions using secondary steam (pp. 16-48); utilization of hot gases and hot fluids in the food industry (pp. 48-60); utilization of boiler house gases for drying purposes (pp. 60-89); utilization of the heat of baking gases in the baking industry (pp. 89-94); utilization of the heat from boiling and hot water (pp. 94-104); utilization of heat from products and wastes (pp. 104-113); and new prospective methods of utilizing waste heat in the food industry (pp. 113-148). SW

0.7 (4.9) NUTRITION CLASSICS. A NEW DEFICIENCY DISEASE PRODUCED BY THE RIGID EXCLUSION OF FAT FROM THE DIET

Burr, George O., and Mildred M. Burr (Dept. of Botany, University of Minnesota, Minneapolis, Minn.)
Reprinted from the Journal of Biological Chemistry 82, 345-367 (1929)
Nutrition Reviews 31, No. 8, 248-249 (Aug. 1973)

This paper is the first of a series expected to be presented on the subject of the effects of fats in the diet. The authors believe that the data presented proves the essentiality of fats in the diet of the rat. The rats were fed a high purity diet with extremely low fat content. Rats fed this diet developed a new deficiency disease in which caudal necrosis occurred followed by early death in comparison to rats fed diets containing fats or constituents of fat. Furthermore, diets containing the nonsaponifiable fraction of fats and glycerol were ineffective for curing the disease. The disease was prevented by the addition of 2% fatty acids to the diet. The authors did not draw any conclusions from the data, but they suggested that the dietary deficiency is due to the absence from the diet of the acids present in fats.
[1 figure] SW

0.8 (2.12) ESTIMATION OF THE INTENSITY OF A FILTERED POISSON PROCESS AND ITS APPLICATION TO ACOUSTIC ASSESSMENT OF MARINE ORGANISMS

Ehrenberg, John E.
Sea Grant Publication WSG 73-2, Division of Marine Resources, University of Washington, Seattle, WA 98105 (May 1973), 135 pp.

This report is a dissertation on methods for statistically estimating the intensity factor of a filtered Poisson process and the use of the methods to determine the structure and analyze the performance of signal processors that estimate the spatial density of marine organisms.
[18 figures, 35 references, 4 appendixes] FTP

0.7 (8.42)(9.19) EFFECTS OF REGULATORY GUIDELINES ON THE INTAKE OF MERCURY FROM FISH--THE MECCA PROJECT

Finch, Roland (Fishery Products Research and Inspection Division, National Marine Fisheries Service, NOAA, Washington, DC 20235)
Fishery Bulletin 71, No. 3, 615-626 (July 1973)

The MECCA program applies a survey of the fish consumption habits of a sample of over 4,500 individuals, representative of the U.S. population, to build a computer model, which uses known levels of microconstituents in 52 kinds of fish to predict the distribution of the daily intakes of the microconstituents from fish among the survey participants. The model was applied to mercury levels in fish to estimate the effects of guidelines (maximum permitted levels) for fish in protecting the population against excessive intake. The study indicated that, for the sample population, intakes of mercury from fish would remain safe if the guideline for mercury in fish were raised from the present level of 0.5 ppm to 1.5 ppm. The effect of such an increase would be of benefit to both the consumer and the fishing industry. This model can be used to predict the distribution of consumer intakes from fish of any constituent present in the fish, whether nutritious or potentially hazardous, for which the levels in the edible portion of the 52 kinds of fish used in the model are known. [MECCA means Model for the Estimation of the Consumption of Contaminants from Aquatic Foods.]
[5 tables, 7 references, 1 appendix] Author's abstract

0.7 (8.5)

Species	Total polyunsaturates	Docosahexaenoic acid (C22:6)	Species	Total polyunsaturates	Docosahexaenoic acid (C22:6)
	%	%		%	%
Sardines, California (pilchard)	7.4	2.6	Crab, blue	0.60	0.21
Shad	4.0	2.5	Scallops	0.50	0.24
Mackerel, Atlantic	3.6	1.4	Perch, ocean	0.50	0.25
Salmon, king	3.2	1.0	Red snapper	0.39	0.34
Whitefish, lake	2.0	0.65	Cod	0.38	0.23
Tuna, canned dietetic pack, albacore	1.8	1.2	Sole, lemon	0.36	0.07
Mullet, striped	1.7	0.55	Clams	0.33	0.15
Herring, ocean	1.7	0.68	Squid	0.32	0.22
Swordfish	1.2	0.73	Halibut	0.26	0.08
Tuna, canned dietetic pack, bluefin	1.2	0.61	Shrimp	0.24	0.07
Oysters, Pacific	1.0	0.33	Haddock	0.20	0.12
Rockfish, pinninger	0.69	0.35	Tuna, canned dietetic pack, yellowfin	0.19	0.13
			Hake	0.17	0.05
			Abalone	0.1	trace

Note: Analyses are for the bone- and skin-free flesh of raw fish or the drained shell contents of shellfish, and for the drained contents of the canned tuna.

0.8 (3.23)(3.33)(3.63) AN EXAMPLE OF SIMULATION APPLIED TO FOOD ENGINEERING

Greenfield, P. F. (CSIRO Division of Food Research, North Ryde, New South Wales, 2113, Australia)
Food Technology in Australia 25, No. 10, 502-503, 505, 507 (Oct. 1973)

Mathematical simulation or modeling represents a system either by equations or statistical parameters. In this article the results of the modeling of a cyclic-pressure freeze drying system are discussed.

Many engineering processes involve heat, mass transfer, and other factors which may be represented by mathematical expressions. A cyclic-pressure process for the freeze drying of foods is used as an example. The physical phenomena associated with the process, such as thermal conductivity of the material, temperature fluctuations in response to pressure changes, and vapor transport mechanisms were converted to a series of differential equations which were then solved in a digital computer. The data used to develop the equations was generated by measurements made during experimental freeze drying of sucrose, gelatin, and yogurt. The agreement between the experimental results and the results obtained by simulation was found to be satisfactory.

The author suggests several uses for the model that was developed: (1) the determination of drying times and conditions for various foodstuffs, (2) application to larger scale freeze dryers, and (3) mathematical optimization of the relative cycle times to bring about faster drying.
[6 figures, 7 references] SW

0.9 TECHNOLOGY ASSESSMENT -- WHERE IT STANDS TODAY

Coates, Vary T. (Technology Assessment Group, Program of Policy Studies in Science and Technology, George Washington University, Washington, D.C.)
Research Management 16, No. 5, 12-17 (Sept. 1973)

In the last few years technology assessment has been receiving increasing attention in government and in industry. In this article, the author reviews and analyzes the nature, procedures, and usefulness of technology assessment with particular emphasis on the government sector. Technology assessment is defined as the systematic identification, analysis, and evaluation of the potential impacts of technology on social, economic, environmental, and political systems, institutions, and processes. It is concerned in particular with the second and third order impacts of technological development, and with the consequences that may result from the introduction of new technology or from significant changes in the application or level of utilization of existing technologies. In technology assessment, attempts are made to identify options and to clarify the trade-offs which must be made by anticipating the societal and industrial changes that may be set in motion by a decision or action. The approach is intended to provide a neutral and objective informational input into decision making and policy formulation with regard to science and technology.
[4 references] FTP

0.9 (9.7) A NEW LOOK AT THE R&D TECHNICIAN

Kassem, M. Sami (European Institute of Business Administration, Fontainebleau, France), and D. F. St. John (Owens-Illinois, Inc. Technical Center)
Research Management 16, No. 5, 32-37 (Sept. 1973)

Technicians are a unique, growing, and important occupational group in industry. They are a distinct group in their needs, interests, and frame of reference. In this article the authors discuss the technician's background, his ambitions, and what motivates him. They also offer some suggestions as to what R&D managers can do to improve the performance of technicians.

The study sample consisted of engineering and physical science technicians in two companies. The study method was by questionnaire.

Work itself was selected by most of the technicians as a satisfying factor; achievement ranked second among factors chosen. Achievement, however, ranked first as to importance in motivating the technician in his work environment. Lack of responsibility, lack of advancement, salary, and the work itself composed the largest percentage of factors selected as leading to job dissatisfaction. The factors with the highest relative importance--subordinate relationship and personal life--were chosen by relatively few technicians.

Those young, ambitious technicians who wanted to become scientists or engineers considered the occupation of a technician somewhat below what they were capable of doing; they were, in a sense, in transit. Individuals who wanted to continue working as technicians were more satisfied with factors such as achievement

0.9 (9.7) MOTIVATING R&D PERFORMANCE IN A STABLE ORGANIZATION

Farris, George F. (Organizational Psychology and Management, Alfred P. Sloan School of Management, Massachusetts Institute of Technology, Cambridge, Mass.)
Research Management 16, No. 5, 22-27 (Sept. 1973)

The author first discusses several motivational models of technical performance, each of which is characterized by a different image of the technical person and implies different managerial strategies to motivate performance. Then he relates these models to conditions one would expect to find in a stable organization and presents findings on technical performance under these conditions. Finally, he suggests managerial strategies to compensate for the motivational disadvantages of a stable organization and to take advantage of motivational opportunities which a stable organization can provide. Some of the appropriate actions that may be taken in a stable organization to enhance technical performance are: (1) Increase technical collaboration, (2) Regroup technical teams, (3) Develop key people in the informal organization, (4) Encourage greater internal contacts, through seminars, location, and design of offices, creating task forces, etc., (5) Encourage greater external contacts, (6) Assign people to multiple tasks to broaden their perspective and improve the challenge of their work, (7) Increase sense of time pressure (higher technical performers work under greater time pressure than do lower performers), and (8) Reward people demonstrating high performance with more challenging work. FTP

0.9 (9.6) BIBLIOGRAPHY OF THE PHILOSOPHY OF TECHNOLOGY

Mitcham, Carl (Berea College), and Robert Mackey (Brandeis University)
Technology and Culture 14, No. 2, Part II, xv + 205 pp. (Apr. 1973)

Although it is popularly held that technology is "a good thing," there appears to be some fear that it might be too much of a good thing. This questioning of the beneficence of technology has become a part of the questioning of all institutions and value systems; technology is embedded in the larger matrix of society. This annotated bibliography serves to reveal how philosophic investigations into technology cover nearly every aspect of technology's involvement with man, society, and nature. The bibliography is divided into five major categories as follows: (1) Comprehensive philosophical works, (2) Ethical and political critiques (includes Soviet and East European materials), (3) Religious critiques, (4) Metaphysical and epistemological studies, and (5) The appendix (classical documents and background materials). FTP

1.36 (9.6) INTERNATIONAL ATLANTIC SALMON SYMPOSIUM

Smith, Morden W., and Wilfred M. Carter (editors)
International Atlantic Salmon Foundation, New York Special Publication Series 4, No. 1, (Sept. 1973), xi + 504 pp.

The symposium was held at the Huntsman Marine Laboratory, St. Andrews, New Brunswick, Canada, Sept. 20-22, 1972. The keynote address titled "Outlook for Atlantic Salmon" (p. 3) was followed by the first session which dealt with the subject, "The Effects of Man and a Changing Environment Upon the Atlantic Salmon" (p. 11-35). In addition to the opening remarks, three papers were presented in this session. The second session was titled "Physiology" (p. 41-141). Five papers were given on the physiology of the Atlantic salmon. The third session was held on the subject "Ecology" (p. 145-216); four reports were presented. The fourth session dealt with "Aquaculture" (p. 219-284), with six papers given. Session five was entitled "Environmental Engineering and Fishery Economics" (p. 297-445) with five papers delivered, and session six covered "Conservation and Fisheries" (p. 373-445) in which six papers were presented. A section is included on "Supplementary Papers" (p. 449-501) which covered reports on restoration of the Atlantic salmon in various parts of the world. SW

0.9 TECHNOLOGY ASSESSMENT -- ITS ROLE IN CORPORATE PLANNING

Alpher, Ralph A., and Roland W. Schmitt (Corporate Research and Development, General Electric Co., Schenectady, N.Y.)
Research Management 16, No. 5, 18-21 (Sept. 1973)

In this article, the authors discuss the role which technology assessment might play in industry, and they illustrate how technology assessment entered into a specific company's managerial and planning operations. A formally structured technology assessment program may not be necessary in many corporations; an extension of certain existing activities can take into account the new consumer and societal factors.
[11 references] FTP

1.7 (9.6) THE LIFE OF SHARKS

Budker, Paul (English version by Peter J. Whitehead)
Columbia University Press, New York (1971), xvii + 222 pp. $3.95, paperback.
Albert L. Tester (reviewer)
Transactions of the American Fisheries Society 102, No. 4, 851-852 (Oct. 1973)

This book is a revised, updated version of La Vie des Requins by P. Budker published in 1946. The P. J. Whitehead revision has additional scientific information on sharks, generated since the first publication of the book in French, and includes aspects of sharks in relation to man. The subjects covered are: the hydrodynamics of form relative to swimming and maneuvering; the anatomy of head, tail, skeleton, teeth, viscera, and sensory organs in comparison with bony fishes; and food and feeding habits. Some of the findings on anatomy and physiology of the shark ear available since 1950 are not included. The reviewer concludes that the book is a useful body of information for the general reader particularly in separating fact from fiction regarding sharks. SW

0.9 (9.7)

and recognition and less dissatisfied with the work itself, low responsibility, or low pay.

Management might help maximize motivation and minimize dissatisfaction among technicians and thus improve performance by: (1) Recognizing that technicians are a separate and distinct group in terms of their needs, interests, and their frame of reference, (2) Improving the job environment of technicians and providing them with one that is conducive to the growth and development of their careers, and (3) Efficiently using the technicians talents and skills.
[14 references] FTP

1.87 (1.0117) GUIDE TO THE LOBSTERS AND LOBSTER-LIKE ANIMALS OF FLORIDA, THE GULF OF MEXICO AND THE CARIBBEAN REGION

Opresko, Lee, Dennis Opresko, Ronald Thomas, and Gilbert Voss
Frederick M. Bayer (editor)
Sea Grant Field Guide Series No. 1, University of Miami, Miami, FL 33149 (Aug. 1973), 44 pp. Price $3.00.

This manual provides the nonspecialist with the means of identifying in the field, both the shallow-water and deep-water lobsters which either are already fished commercially or might be fished if sufficient stocks could be discovered through exploratory fishing. A key for identification is given, and it includes illustrations and explanations of the important features used for identification of the animals. The geographical distribution and depth range of the various species are included. Also, when known, the growth rates, spawning periods, temperature, and bottom conditions are given. Further information is provided on size of catch and species taken and on the type of gear used for harvesting.
[17 figures, 14 illustrations, 50 references] FTP

0.9 THE CHANGING STYLE OF RESEARCH IN THE BUSINESS ENTERPRISE

Harwood, Julius J. (Scientific Research Staff, Ford Motor Co.)
Research Management 16, No. 5, 8-11 (Sept. 1973)

Although many persons project a declining role for research in the business plan, the author believes that industry increasingly will look to its research as the pivot upon which the interplay between industrial and social objectives will turn.
[4 references] FTP

1.86 THE RED CRAB
(1.0115)(2.3)

Meade, Thomas L. (Marine Experiment Station, Graduate School of Oceanography, University of Rhode Island), and George W. Gray, Jr.
Marine Technical Report Series No. 11, University of Rhode Island, Narragansett, RI 02882 (1973), 21 pp.

This report is divided into two parts; the first part deals with exploratory fishing for red crab on the continental slope off the northeastern United States coast, and the second part describes the results of experimental studies on the handling, processing, and marketing of red crab products.

Commercial quantities of deep-water red crab were taken in exploratory fishing operations in depths of 220 to 350 fathoms off the northeastern U.S. coast. The continental slope between Veatch and Atlantic canyons produced up to 3,500 lb of red crab per hour's towing time. The standard otter trawling gear was used. Limited tests with crab pots indicated that this method may be the more desirable one for fishing if the crabs are to be landed alive.

Detailed suggestions for handling, processing, and marketing red crab are given. Basically, the plant procedure for preparing crab meat is as follows:

1. The crabs are killed by drowning in fresh water or by spiking the nerve center or brain; the latter method is preferred. The crabs must be alive and in good condition prior to the start of the processing, but they must be killed prior to boiling. The crabs are then butchered, and cleaned and washed.

1.951 THE CENSUS OF NORTHERN ELEPHANT SEALS ON SAN MIGUEL ISLAND, 1965-1973

Carlisle, John G., Jr. (Marine Resources Region, California Dept. of Fish and Game, Sacramento, CA 95819)
California Fish and Game 59, No. 4, 311-313 (Oct. 1973)

Northern elephant seals were believed to be extinct off the California and Mexican coasts 75 to 80 years ago. Seal hunters had depleted their numbers until they were no longer plentiful. Another observer reported that the elephant seals reappeared on San Miguel Island about 1938 and were probably derived from a single family group. Beginning in 1965 an annual census of elephant seals has been conducted on San Miguel Island, the most important site for their breeding in California. Before 1965, the peak population was estimated at 800 animals. Since 1965 the population of the rookery has expanded. Most of the elephant seals haul out on a sandy beach at the west end of the island. Two biologists walk among them and count as they go. The population on the island reaches a peak during the breeding season in January and February annually; after that time the bulls begin to leave the island for pelagic existence followed later by the other animals. The highest count was made in 1967 when the total was 3,700 elephant seals; the count has been as low as 2,200 in 1970. In the count made in March 1973, the number of elephant seals was determined to be 3,600.
[1 table, 2 references] SW

1.93 THE BROTHERHOOD OF THE GREEN TURTLE
(9.17)

Robinson, Peg
American Fish Farmer & World Aquaculture News 4, No. 11, 4-7 (Oct. 1973)

The Caribbean Conservation Corporation (CCC) is a nonprofit group with headquarters in Tallahassee, Fla. The CCC, operating through unpaid workers, has been the strongest voice in awakening concern for the survival of sea turtles. It has won aid from the International Union of Conservation of Nature and Natural Resources and from the World Wildlife Fund.

On the beach of a national refuge Dr. Archie Carr of the CCC and his assistants collect the green turtle eggs in the laying season. The eggs are hatched at the CCC hatcheries, and the young turtles are flown to turtle-depleted islands throughout the Caribbean Sea. Local fisheries officials then release the turtles to the sea or keep them for a year to grow larger. In 12 years over 175,000 turtle hatchlings have been released to the sea. The U.S. Government has permitted Navy airplanes to deliver hatchlings or eggs to Costa Rica, Nicaragua, Anguilla, Puerto Rico, Florida, Barbados, Ascension, Mexico, Bahamas, St. Vincent, Grenada, Cayman Islands, Texas, St. Kitts, Surinam, Venezuela, Guiana, Jamaica, Virgin Islands, British Honduras, Bimini, Colombia, Panama, French Guiana, Bermuda, and St. Lucia. The hatching beaches at Avis Island, Bermuda, and Tortuguero are supplied from CCC sources. Information gathered by members of the CCC indicates that 1-year-old turtles, about 10 inches in diameter, graze on turtle grass. From Tortuguero, on the Caribbean side of Costa Rica, tagged turtles have been observed to migrate to

1.953 SPERM WHALES IN THE WESTERN SOUTH PACIFIC

Gaskin, D. E. (Dept. of Zoology, University of Guelph, Guelph, Ontario, Canada)
New Zealand Journal of Marine and Freshwater Research 7, Nos. 1-2 (June 1973)

The distribution and movements of sperm whales was examined within the region of the western South Pacific Ocean bounded by latitudes 30° S. and 70° S. and longitudes 150° E. and 150° W. (New Zealand lies about 500 miles northwest of the center of this region).

The data used in the study came from an undetermined number of catches by nineteenth century American whaling ships, from 9,720 catches in 1961-70, and from 427 sightings in 1967.

The distribution of females decreased southwards abruptly at about latitude 44° S. in the Tasman Sea (west of New Zealand) and at about 46°-47° S. east of New Zealand. Almost no females occur south of 50° S. The male population density decreases between 50°-70° S. to about 25% of that occurring between 30°-50° S. The pattern of sperm whale distribution and its seasonal fluctuation probably correlate with the vertical temperature gradients of about 5° C in the upper 100 m of water which provide optimal conditions for the schooling of squid. Squid are the main food of sperm whales in this region. The records indicate that catch per unit effort in autumn is lower than in spring. This infers a northward population shift away from an area of reduced numbers of food species and reduced temperature tolerances of calves which are born towards the end of the antipodal summer. Some males overwinter in areas where the water temperature is favorable to abundance of food species; such an area is off the Chatham Islands about 500

1.93 (9.17)

waters off Brazil 1,400 miles away; they return along the same route for mating and egg laying. Personnel of the Florida Dept. of Natural Resources have also been involved in rearing, tagging, and releasing green turtles. The chief of the Florida Bureau of Marine Science and Technology has been urging the conference of representatives of countries on the Caribbean rim to discuss protection and management of marine turtles.
[8 photographs] SW

1.953

miles east of New Zealand. The low antipodal summer surface temperature of the waters south of South Island (N.Z.) may inhibit the passage of breeding schools of sperm whales (with calves) from one side of the New Zealand archipelago to the other. Since sperm whales normally do not pass through Cook Strait (lying between the two main islands comprising New Zealand), the author suggests that there may be two "unit stocks" of the whales, one unit moving seasonally between the central Tasman Sea (west of New Zealand) and the Fiji-Tonga region (north of New Zealand), the other unit moving between the east coast of South Island and the region just north of the Chatham Islands. There is a possibility that these two stocks may mix in the waters north of New Zealand in the winter.
[9 figures, 2 tables, 35 references] SW

1.86 (1.0115)(2.3)

2. The crab sections are then cooked in boiling water from 4 to 10 min (whole crabs are ordinarily cooked 25 to 30 min). Fresh water or water containing 2 to 3% salt may be used.

3. The crab sections are cooled in flowing clean water to at least 45° F.

4. The crab meat is picked by hand, for a high-quality product. The method of Andreas Holmsen [Occasional Paper 68-138, University of Rhode Island, Dept. of Food and Resource Economics (1968)] is described. The recovery of meat is about 20-22% on the live weight basis. The meat may also be frozen by conventional methods in plate or blast freezers.

The waste material from the red crab was ground and dehydrated azeotropically. The resulting meal contained 31.1% crude protein, 0.1% fat, 20.3% fiber, 10.0% moisture, and 43.9% ash.
[1 figure, 7 tables, 19 references] FTP

2.00 (0.8) PHENOLASES AND BLUE DISCOLORATION IN WHOLE COOKED DUNGENESS CRAB (CANCER MAGISTER)

Babbitt, J. K., D. K. Law, and D. L. Crawford (Dept. of Food Science & Technology, Oregon State University Seafoods Laboratory, Astoria, OR 97103)
Journal of Food Science 38, No. 6, 1089-1090 (Sept.-Oct. 1973)

Occasionally the meat of whole cooked Dungeness crab develops a blue to blue-black discoloration, greatly reducing the acceptability (or quality) of the product. The blue discoloration is related to the condition of the live crab, to handling and holding conditions of the crab during processing, and to undercooking of the crab. Enzymes that were capable of oxidizing tyrosine, dopa (3,4-dihydroxyphenylalanine), and pyrocatechol to colored chromophores were isolated from the Dungeness crab. Ascorbic acid (antioxidant) and phenylthiourea (chelating agent) prevented the enzymatic oxidation of dopa and pyrocatechol. However, heat denaturation of the crab blood did not prevent the oxidation of dopa or pyrocatechol to melanins, especially under alkaline conditions and in the presence of copper and iron. Apparently, the metals may catalyze the oxidation of polyphenols to melanins by way of enzymatic as well as nonenyzmatic pathways, particularly under alkaline conditions.
[2 tables, 9 references] FTP

2.113 VINYL WEED-RESISTANT ANTIFOULING. PRACTICAL APPROACH TO LABORATORY FORMULATIONS

Mearns, R. D. (Goodlass Wall and Co. Ltd., Speke/Liverpool, England)
Chemical Abstracts 79, No. 18, 106177j (Nov. 5, 1973)

2.145 BRINE SHRIMP HARVESTING APPARATUS

London, S. Paul; Metaframe Corp. (pat.)
U.S. Patent 3,768,193 (Oct. 30, 1973)

This apparatus is designed to harvest brine shrimp, Artemia sp., by automatically and continuously transferring the shrimp from the water into appropriate collection buckets. FTP

2.113 MANUFACTURE OF ANTIFOULING PAINT USING MICROCAPSULES

Berengier, Rene (pat.)
France 2,155,166 (June 22, 1973)
Chemical Abstracts 79, No. 18, 106207u (Nov. 5, 1973)

2.3 SHELLFISH PROCESSING

Ouw, W. B. G., and A. L. Johnson; Long Island Oyster Farms Inc. (pat.)
U.S. Patenc 3,755,855
Food Technology 27, No. 12, 88 (Dec. 1973)

Oysters are opened by exposing the shell at the point of the adductor muscle to a concentrated beam of infrared light. FTP

2.113 COAL TAR-URETHANE AND COAL TAR-EPOXY FINISHES FOR METAL

Brown, Philip (U.S.A.)
Chemical Abstracts 79, No. 18, 106197r (Nov. 5, 1973)

2.3 MEAT-BONE SEPARATION

McFarland, A. R. (pat.)
U.S. Patent 3,741,772
Food Technology 27, No. 10, 108 (Oct. 1973)

Ground fish (or other meat) products are fed through a perforated conduit by a screw conveyor; the material is thus compacted and the inedible components are separated. FTP

2.3 FISH PROCESSING
(6.134)

Sildoljе-AG Sildemel-Inds. Forsknings Inst. (pat.)
British Patent 1,318,021
Food Technology 22, No. 10, 108 (Oct. 1973)

Whole fish are heated, with continuous agitation, at 45°-55° C. Oil and a solid residue are obtained; the residue may be further dried to form a meal. FTP

2.117 GLASS-TRANSITION BEHAVIOR OF LATEX-INTERPENETRATING POLYMER NETWORKS BASED ON METHACRYLIC-ACRYLIC PAIRS

Sperling, L. H., Tai-Woo Chiu, and D. A. Thomas (Mater. Res. Cent., Lehigh Univ., Bethlehem, Pa.)
Chemical Abstracts 79, No. 18, 105686n (Nov. 5, 1973)

2.113 DEVELOPMENTS IN ANTIFOULING PAINTS

Lorenz, J. (England)
Chemical Abstracts 79, No. 18, 106187n (Nov. 5, 1973)

2.144 ATTRACTING AND CONTROLLING COASTAL PELAGIC FISH
(2.1475) WITH NIGHTLIGHTS
(1.0117)

Wickham, Donald A. (National Marine Fisheries Service, NOAA, Southeast Fisheries Center, Pascagoula, MS 39567)
Transactions of the American Fisheries Society 102, No. 4, 816-825 (Oct. 1973)

Previous work by investigators of the National Marine Fisheries Service indicated that light attraction techniques could be used to supplement conventional purse seining operations. This present article is a report on experiments in the northeastern Gulf of Mexico using a stationary lamp and a moving lamp to attract and concentrate coastal pelagic fish. Fish were attracted successfully by a 1,000-watt mercury vapor lamp on a skiff and on the nearby research vessel. Illumination of the skiff light, with the light on the research vessel off, caused the fish to move toward the skiff; darkening of the skiff light and illumination of the light on the research vessel attracted the fish toward the research vessel. Confirmation of the fish movements was obtained by echo sounder recordings.

A series of experiments were conducted with a lamp in either a drifting or powered skiff. The fish were successfully led for distances up to 1 km. In another experiment dense fish aggregations that form around submerged artificial structures, such as drilling platforms, were attracted by a light on the moving skiff. The fish were led clear of the structure for capture by purse seine. The results of these experiments have established the feasibility of applying night-lighting techniques to harvesting coastal pelagic fish in the Gulf of Mexico. The species attracted to the lights included: Spanish sardine, round scad, blue runner, striped anchovy, and scaled sardine.
[6 figures, 19 references] SW

2.113 ANTICORROSIVE PAINTINGS FOR THE PROTECTION OF BOAT HULLS. IV. COMPATIBILITY WITH CATHODE PROTECTION FOR SACRIFICE ANODES

Caprari, Juan J. (Secc. Technol. Pinturas, Lab. Ensayo, Mater. Invest. Technol., La Plata, Argentina)
Chemical Abstracts 79, No. 18, 106179m (Nov. 5, 1973)

2.43 (3.238)(3.338) SOME ASPECTS OF THE MICROBIOLOGY OF PACKAGED FOODS

Richardson, K. C. (Division of Food Research, CSIRO, North Ryde, New South Wales, Australia)
CSIRO Food Research Quarterly 33, No. 3, 59-63 (Sept. 1973)

All stages of food processing require correct practices to prevent microbial spoilage. This applies also to the packaging materials of the final product. The factors that determine whether microorganisms can grow are availability of nutrients, concentration of inhibitors (natural or added), temperature, pH, water activity, and oxygen concentration. The packaging material and method of packaging will affect all of these factors to some degree.

Most foods contain the nutrients required for microbial growth, and the packaging system does not significantly influence this factor.

There are many chemical inhibitors of microbial growth; those naturally present in food include organic acids, spices, alcohol, and carbon dioxide. Added inhibitors (sanctioned by law) include sulfur dioxide, benzoic acid and derivatives, sorbic acid, propionic acid, and sodium nitrate. The activity of these inhibitors can be influenced by the effects of the packaging material on oxygen content or water availability. In addition, the inhibitory activity of the chemical provided by its concentration may be lost if the packaging material is permeable to the atmosphere. The compound may be oxidized and lose its inhibitory activity permitting growth of microorganisms on the food.

2.8 ACCEPTABILITY OF MAIN DISHES (ENTREES) BASED ON MIXTURES OF GROUND BEEF WITH GROUND FISH OBTAINED FROM UNDER-USED SOURCES

King, Frederick J. (Atlantic Fishery Products Technology Center, National Marine Fisheries Service, NOAA, U.S. Dept. of Commerce, Emerson Ave., Gloucester, MA 01930)
Journal of Milk and Food Technology 36, No. 10, 504-508 (Oct. 1973)

Several types of acceptable main dishes were prepared using a mixture of ground beef and ground fish in well-known main dish recipes. The author hopes that these favorable results will stimulate further development of food items based on mixtures of ground beef and ground fish.
[4 tables, 19 references] FTP

3.12 INFLUENCE OF NITRITE AND NITRATE CURING INGREDIENTS ON QUALITY OF PACKAGED FRANKFURTERS

Simon, S., D. E. Ellis, B. D. MacDonald, D. G. Miller, R. C. Waldman, and D. O. Westerberg (Union Carbide Corp., Films--Packaging Div., Food Science Institute, Chicago, IL 60638)
Journal of Food Science 38, No. 6, 919-923 (Sept.-Oct. 1973)

The purpose of this study was to determine if nitrite is necessary, and, if so, the level required to produce a frankfurter of acceptable taste quality. In addition, the study considered the importance of frankfurter formulation, the addition of nitrate and antioxidants, and smoking and storage conditions. Two frankfurter formulations were used; one, termed all meat, contained beef and pork and the other contained all beef. Ice, salt, seasoning, and sodium isoascorbate were used in both formulations. Both groups of frankfurters were prepared with combinations of 0, 1/16, 1/8, and 1/4 oz sodium nitrite per 100 lb of meat (equivalent to 0, 39, 78, and 156 p/m, respectively, based on meat weight) and 0 and 3/4 oz of sodium nitrate. Addition of 1/4 oz of sodium nitrite to 100 lb of meat is the maximum level permitted in the United States. The frankfurters were vacuum packaged in mylar/saran/polyethylene pouches or bulk packaged in VISTEN stretch bags (without vacuum). The test samples were stored in a lighted commercial display case at 4.5°-6.3° C for up to 4 weeks. At various intervals of storage, the samples were examined organoleptically; they were also analyzed for cured pigment conversion and for general bacteriological quality.

All meat (beef and pork) frankfurters had low taste panel scores initially and throughout the storage period. Those all meat frankfurters having the higher

3.12 EFFECTS OF SODIUM CHLORIDE AND CONDENSED PHOSPHATES ON THE WATER-HOLDING CAPACITY, pH AND SWELLING OF CHICKEN MUSCLE

Shults, G. W., and E. Wierbicki (Food Lab., U.S. Army Natick Laboratories, Natick, MA 01760)
Journal of Food Science 38, No. 6, 991-994 (Sept.-Oct. 1973)

Additions of 0.25-0.5% sodium salts of (1) pyrophosphate, (2) a mixture of one part tripolyphosphate and one part hexametaphosphate, and one part pyrophosphate, (3) the commercial phosphate mixture Kena FP-28, or (4) tripolyphosphate are effective for the reduction of the loss of natural juices during the cooking of chicken meat. The reduction in the loss of natural juices during cooking of chicken meat is enhanced when the polyphosphates are used in combination with sodium chloride. The addition of 0.3% polyphosphates to raw chicken meat is sufficient to provide the optimum reduction of cooked-out juices during cooking of the meat.
[7 figures, 2 tables, 14 references] FTP

2.9 TOXICANTS OCCURRING NATURALLY IN FOODS
(9.6)

Committee on Food Protection, Food and Nutrition Board, National Academy of Sciences
National Academy of Sciences, Printing and Publishing Office, 2101 Constitution Ave., Washington, DC 20418 (n.d.), 2d ed., viii + 624 pp. Price $10.50. Order No. ISBN 0-309-02117-0.

The first edition of this book was published in 1966; the present edition contains recent information that has become available. The 26 chapters are authored by specialists in the field. Pertinent chapters deal with nitrates and nitrites, trace elements, natural radioactivity in the biosphere and foodstuffs, potential toxicity of food lipids, toxicity of vitamins, and seafood toxicants. The information in this book is primiarly addressed to public health workers, nurses, nutritionists, regulatory agency personnel, medical personnel, food technologists, and food industry operators. Although the text is technical in nature, it is written in such a way as to be intelligible and useful to nonspecialists.
FTP

3.12 FISH PRESERVATION

Bird Provision Co. (pat.)
German Patent 1,492,582
Food Technology 27, No. 12, 89 (Dec. 1973)

Comminuted fish muscle is mixed with fat and spices, sealed in airtight bags, and cooled to 0° C.
FTP

3.12 PRESERVATIVES FOR WEINER SAUSAGE AND FISH PASTE
(6,54)

Obata, Shigeo, Shiro Ohnashi, and Yukihiro Oda (Sanei Chemical Industries, Ltd.) (pat.)
Japan. Kokai 73 44,417 (June 26, 1973)
Chemical Abstracts 79, No. 15, 90655a (Oct. 15, 1973)

2.43 (3.238)(3.338)

Temperature is another factor that is not significantly affected by packaging material.

A pH below 4.5 prevents growth of Clostridium botulinum, the most toxic and heat resistant of the food poisoning bacteria. The pH of most foods lies in the acid range 3.5 to 6.5. Those foods in the pH range 4.5 and above must be processed at temperatures above 116° C to prevent the growth of C. botulinum.

In the field of nonsterile packaged foods, the properties of water activity and oxygen partial pressure are important. Varieties of foods depend for their microbiological stability on the presence of a high concentration of dissolved solids, or in other terms, a low moisture content. Packaging material for nonsterile food products must be selected on the basis of the water activity (a_w) of the food. Foods with a low a_w must be packaged in materials highly impermeable to water. Foods with a high a_w may be packaged in materials that are permeable to water to encourage loss of moisture and prevent microbial growth.

The extent to which a packaging material presents a barrier to oxygen may influence the activities of microorganisms on the surface of foods. Packaging films highly permeable to oxygen are used for short-term storage of meat, at refrigeration temperatures, to enhance appearance. On the other hand cured meat requires packaging material that is impermeable to oxygen to retain a desirable color.

The choice of packaging material may have a strong effect on the type of microbial population that develops; consequently, the packaging material can determine how long a food will remain acceptable under proper conditions of storage.
[1 figure, 12 references]
SW

3.12

nitrite levels showed higher taste panel scores which increased during storage of the samples. Nitrate added to the frankfurters did not have any affect on the taste panel scores. Nitrite or nitrate had no effect on the taste panel scores of the all beef frankfurters.

Nitrate did not affect cured pigment conversion but the formation of cured color was directly related to the level of nitrite in the frankfurters. The nitrite and nitrate levels had no effect on the bacterial counts of the frankfurters.

In tests with all meat frankfurters, the addition of BHT (butylated hydroxytoluene)improved only slightly the flavor of uncured frankfurters, and smoking for 5 min did not significantly improve the flavor.
[7 tables, 23 references]
FTP

3.12 PRESERVATIVES FOR FISH PASTE
(6,54)

Obata, Shigeo, Shiro Ohnashi, and Yukihiro Oda (Sanei Chemical Industries, Ltd.) (pat.)
Japan. Kokai 73 44,418 (June 26, 1973)
Chemical Abstracts 79, No. 15, 90654z (Oct. 15, 1973)

3.12 PRESERVATIVE

Eisai Co. Ltd. (pat.)
Japanese Patent 73/16612
Food Technology 27, No. 10, 112 (Oct. 1973)

Foods, such as fish paste, cheese, and butter, show increased storage stability when treated with bacteriolytic and oxygen-reducing enzymes. FTP

3.4 SPORTSMAN'S GUIDE TO HANDLING, SMOKING, AND PRESERVING COHO SALMON

Dudley, Shearon (National Marine Fisheries Service, Middle Atlantic Coastal Fisheries Center, Milford, Conn.), J. T. Graikoski, H. L. Seagran, and Paul M. Earl
Fishery Facts--5, NMFS Extension Publication, National Marine Fisheries Service, NOAA, U.S. Dept. of Commerce, Seattle, WA 98105 (June 1973), 28 pp. For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402. Price $0.25.

This extension publication is a slightly revised version of "Sportsman's Guide to Handling, Smoking, and Preserving Great Lakes Coho Salmon" (Circular 346, Bureau of Commercial Fisheries, Fish and Wildlife Service, U.S. Dept. of the Interior, Sept. 1970). The coho salmon of the Pacific area have been successfully introduced to Lake Michigan. Recent results indicate that introduction of coho salmon to the New England area may also become successful. Because the coho salmon is an introduced species (not native) to the Great Lakes and New England areas, processing guidelines help to promote effective utilization of the fish. Coho salmon apparently lend themselves well to the smoking process. This publication describes the process in detail. Four recipes for preparing coho salmon are given in the appendix.
[15 figures, 9 references, 1 appendix] FTP

3.15 RADIATION PASTEURIZATION OF MEDIUM FATTY FISH. I. CONTROL OF RADIATION-INDUCED OXIDATIVE CHANGES IN WHITE POMFRET (STROMATEUS CINEREUS) BY VACUUM PACKAGING

Kamat, S. V., and U. S. Kumta (Biochem. Food Technol. Div., Bhabha At. Res. Cent., Bombay, India)
Chemical Abstracts 79, No. 3, 17095p (July 23, 1973)

4.11 BUNSEN COEFFICIENT FOR OXYGEN IN MARINE OILS AT VARIOUS TEMPERATURES DETERMINED BY AN EXPONENTIAL DILUTION METHOD WITH A POLAROGRAPHIC OXYGEN ELECTRODE

Ke, P. E., and R. G. Ackman (Dept. of the Environment, Fisheries, and Marine Service, Halifax Laboratory, 1707 Lower Water St., Halifax, Nova Scotia, Canada)
Journal of the American Oil Chemists' Society 50, No. 11, 429-435 (Nov. 1973)

Dissolved oxygen in edible oil leads to autoxidation and rancidity which have undesirable effects on flavor and nutritive value. The presence of oxygen in the fat is a frequent cause of deterioration of fish and related foods. Recent improvements in methodology and procedures for determining dissolved oxygen in liquid fats are difficult to apply in viscous peroxidized or polymerized samples. To overcome these difficulties a polarographic oxygen electrode was applied to an exponential dilution method for the determination of the solubility of oxygen in oils. In addition, a newly designed sample vessel and measuring apparatus (described in the report) were used in the experiments.

Nine oils of various fish and olive oil were used in the investigation. The oils were degassed by application of vacuum, poured into the sample vessel and weighed to ±0.1 g. The sample was gradually brought to the desired constant temperature over a 2-h period with stirring. Breathing grade air was bubbled into the sample as it was heated. Helium was introduced into the oil during the determination of oxygen solubility. The oxygen concentration was read at regular intervals or read as each 10 ml of helium was collected in a gas buret.

The results of the method were compared to a chemical method used by A. K. R.

3.15 (2.15) ON-BOARD RADURIZATION OF ICED OCEAN FISH. PREPARATIONS FOR COMMERCIALIZATION IN THE FEDERAL REPUBLIC OF GERMANY

Diehl, J. F. (Bundesforschunganstalt für Lebensmittelfrischhaltung, 75 Karlsruhe, Engesserstr. 20, Federal Republic of Germany)
Acta Alimentaria Academiae Scientiarum Hungaricae 2, No. 2, 151-161 (1973) (In English)
Food Science and Technology Abstracts 5, No. 10, 189, Abstract No. 10R486 (Oct. 1973)

Most German consumers of fish prefer iced fresh fish over frozen fish. Long distances from German ports to the fishing grounds in the northwest Atlantic are the cause of a problem in the marketing of iced fish. To maintain the quality of the iced fish, the fishing boats must return to port within 15 days of the first catch. Consequently, they often return with incompletely filled holds which causes economic losses to the industry and high prices to the consumer. The alternative is offering frozen fish to the consumer.

On-board irradiation of fish with a dose of 50-150 krad (gamma or X-rays) within 24 h of catch would double the shelf-life of iced fish; thus, the productivity of the ships would be increased by allowing them more time to fill the holds before returning to the ports. In addition a better quality product would reach the consumer. Preliminary trials of an X-ray source are being performed on the research vessel Walther Herwig. The W. German Health Ministry has been petitioned for approval of on-board radurization of ocean fish, on the basis of feeding studies with radurized fish, radappertized fish, and additional microbiological studies carried out in the United States, and the United Kingdom. SW

4.11

McDowell [J. Dairy Res. 30, 399 (1963)] and a physical displacement method used by E. Becker and A. Neiderstebruch [Fette Seifen Anstrichm. 68, 135 (1966)]. Since the polarographic method is not responsive to peroxides and epoxides the results were appreciably different from those obtained by the chemical method to determine oxidized oils. The physical displacement method gave nearly the same results as the polarographic exponential dilution method. Comparative Bunsen coefficients for oxygen in the various oils by the three methods are shown in the report. [6 figures, 4 tables, 35 references] SW

3.13 FOOD PRESERVATION

Kato, Kanefusa, Takashi Odama, and Naoshi Itagaki (Showa Tansan Co., Ltd.) (pat.)
Japan. Kokai 73 52920 (July 25, 1973)
Chemical Abstracts 79, No. 19, 114202d (Nov. 12, 1973)

3.7 DRIED FISH PRODUCT

Eisai Co. Ltd. (pat.)
Japanese Patent 73 24740
Food Technology 27, No. 12, 89 (Dec. 1973)

The fish to be dried is first soaked in an aqueous xylose solution. FTP

4.1 (1.9) EGYPTIAN FISH OILS. EFFECT OF AGING AND ENVIRONMENTAL CONDITIONS ON THE CHARACTERISTIC VALUES AND FATTY ACID COMPOSITION OF ANGUILLA VULGARIS OILS

Shoeb, Z. E., Z. H. M. El-Kiraassy, and F. M. Salama (Fats Oils Lab., Natl. Res. Cent., Cairo, United Arab Republic)
Chemical Abstracts 79, No. 19, 113357w (Nov. 12, 1973)

3.38 (3.336) CORROSION IN DILUTE ACIDS. III. CORROSION KINETICS AND EFFECT OF COLD WORK

Makrides, A. C., and F. Cocke (Dep. Chem., Boston Coll., Chestnut Hill, Mass.)
Chemical Abstracts 79, No. 18, 107100r (Nov. 5, 1973)

3.13 ANTIMICROBIAL TREATMENT WITH GASES, SPECIFICALLY, ETHYLENE OXIDE AND FORMALDEHYDE

Cambrosio, Franco (Dr. E. Baeschlin A.-G., Winterthur, Switzerland)
Chemical Abstracts 79, No. 18, 108021c (Nov. 5, 1973)

4.11 IDENTIFICATION OF FATTY ACID POLYMORPHIC MODIFICATIONS BY INFRARED SPECTROSCOPY

Mitcham, D., A. V. Bailey, and V. W. Tripp (Southern Regional Research Center, U.S. Dept. of Agriculture, New Orleans, LA 70179)
Journal of the American Oil Chemists' Society 50, No. 11, 446-449 (Nov. 1973)

Pure fatty acids were prepared by standard methods and subjected to infrared (IR) spectral analyses. The results indicate that the long chain saturated even carbon numbered fatty acids, and their various modifications, are distinguishable in the 7.5-25.0 μ region of the spectrum. The spectra are unique also for individual long chain odd carbon numbered saturated fatty acids. The IR spectra are shown illustrating similarities and differences resulting from chain length, isomerism, and polymorphic variations in the monounsaturated fatty acids. X-ray diffraction analysis permits further identification of polymorphism.
[8 figures, 7 references] SW

4.61 USE OF NATURAL TOCOPHEROL FOR FROZEN FISH AS ANTIOXIDANT

Tanaka, Kazuo (Tokyo Univ. Fish., Tokyo, Japan)
Chemical Abstracts 79, No. 19, 114103x (Nov. 12, 1973)

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4.62 PROTECTION OF MARINE PRODUCTS FROM DETERIORATION DUE TO THE OXIDATION OF OIL. XIV. APPLICATION OF CITRUS FRUIT TERPENES TO FISH PRODUCTS

Toyama, Kenzo, Koji Anzai, and Keizo Kikuchi (Tokyo Univ. Fish., Tokyo, Japan)
Chemical Abstracts 79, No. 19, 114065m (Nov. 12, 1973)

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4.91 CARDIAC FATTY ACIDS IN RATS FED MARINE OILS
(0.4)

Teige, B., and J. L. Beare-Rogers (Food Research Laboratories, Dept. of Health and Welfare, Ottawa, Ontario, Canada)
Lipids 8, No. 10, 584-587 (Oct. 1973)

In previous work oils containing docosenoic acids (monounsaturated C_{22} fatty acids) fed to rats caused accumulation of triglycerides of fatty acids in the heart muscle. To determine the effects of fish oils in diet on lipid and fatty acid accumulation in heart muscle, experiments were performed on young rats. The fish oils used in the diet were partially hydrogenated Norwegian capelin oil, partially hydrogenated Canadian herring oil, and nonhydrogenated Peruvian anchovy oil. Capelin and herring oil contain more C_{22} fatty acids than anchovy oil. In one experiment, partially hydrogenated capelin oil was fed as 0, 0.5, 1, 2, 4, 8, or 16% of the diet; corn oil and lard were added to make all diets consist of 20% fat. In another experiment partially hydrogenated herring oil or liquid anchovy oil were fed at the 15% level in the diets with 5% corn oil. The fat in the control diet was a 3:1 mixture of lard and corn oil. The rats were fed for 7 days on the diets. Lipids of the rat heart were then extracted and prepared for chromatographic analysis. The results indicate that the levels of fatty acids in the heart muscle were increased only at the highest level of capelin oil in the diet. The increased levels occurred with the 18:1, 18:2, 20:1, and 22:1 fatty acids. In the other experiments, herring oil in the diet caused increases of 18:1, 18:2,

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6.134 PHYSICAL ASPECTS OF THE DRYING OF FISH MEALS

Myklestad, Ole (Norwegian Herring Oil and Meal Industry Research Institute, Bergen, Norway)
Journal of the Science of Food and Agriculture 24, No. 10, 1209-1215 (Oct. 1973)

Investigations were carried out to determine the characteristics of evaporation and diffusion in the drying of fish meal. Batches of capelin, herring, and mackerel were cooked and pressed to separate oil from solids. The herring press cake was divided and ground in three groups: one group contained no stickwater, and the other two groups contained 29%, and 43% stickwater. The press cakes of capelin and mackerel were ground with 30% stickwater. The samples of fish meal were placed on copper trays 50 × 50 mm square and either 5 or 20 mm high, and dried in a wind tunnel.

The drying characteristics of the herring meal have four stages at the conditions of 75° C, 7% r.h., and air flow of 120 m/min as follows: (1) free moisture (kg/kg) declines from 1.0 to 0.8 at a drying rate that declines from 1.4 to 1.0 kg/kg h; (2) free moisture declines from 0.8 to 0.2 at the declining drying rate of 1.0 to 0.6; (3) free moisture declines from 0.2 to about 0.08 at the declining drying rate of 0.6 to 0.4; and (4) free moisture declines from about 0.08 to 0 at the declining drying rate of 0.4 to 0 kg/kg h. This pattern was similar for all meals at 75° C. At four moisture levels, 1.00, 0.75, 0.50, and 0.25 kg/kg and three temperatures, 50°, 75°, and 90° C herring meal containing no stickwater dried quicker and mackerel meal dried slower than the other meals tested. Meals dried faster at the highest temperature, 95° C. In experiments on effects of

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4.91 (0.4)

20:1, and 22:1 fatty acids in the heart muscle; liquid anchovy oil, lacking docosenoic acid, caused no change in the amount of fat deposited in the heart muscle. The authors concluded that the extent of lipid accumulation in the heart muscle is related to the amount of C_{22} fatty acids in the diet.
[5 figures, 1 table, 13 references] SW

4.3 MOLECULAR DISTILLATION EQUIPMENT FOR DESCENDING FILM

García, Luis Alberto, and Ernesto E. Gulden (Fac. Farm. Bioquím., Univ. Nac. Buenos Aires, Buenos Aires, Argentina)
Chemical Abstracts 79, No. 16, 93767z (Oct. 22, 1973)

6.134

humidity, the results show that drying rates generally decreased as relative humidity of the air increased. Herring meal with no stickwater dried quicker than the other meals at reasonably high humidities. Airflow rates of 60, 120, and 240 m/min were tested to determine effects on the drying rate of the fish meals. The air was at 95° C and 1% r.h. At 1 kg/kg moisture content, capelin meal dried at the rates of 1.597, 2.572, and 3.045 kg/kg h, respectively, at the three airflow rates. The increasing drying rate trend was similar for the other fish meals. At 0.75 kg/kg moisture content the airflow rates had the same effect on drying rates as fish meal at the higher moisture content, but at 0.50 and 0.25 kg/kg moisture content an increase in flow rates beyond 120 m/min had only a slight effect on the meals except herring meal with no stickwater and mackerel meal. Herring with 29% stickwater appeared to undergo structural changes at 95° C and high airflow rates.
[1 figure, 7 tables, 4 references] SW

4.14 (1.953) THE LIPID OF THE SPERMACETI ORGAN OF THE SPERM WHALE (PHYSETER CATODON)

Morris, Robert J. (National Institute of Oceanography, Wormley, Godalming, Surrey, England)
Deep-Sea Research 20, No. 10, 911-916 (Oct. 1973)

The sperm whale is the largest of the toothed whales and is capable of diving to depths of 1,000 m for long periods. The head of the sperm whale contains a large wax-filled organ (the spermaceti organ); the function of the organ is not well understood. Other workers have suggested that the organ serves either as a buoyancy regulator or aids in acoustic reception in the search for food.

The lipid structure of the wax present in the spermaceti organ was investigated to determine the possible function of the organ. The major lipid classes were found to be present; wax esters and triglycerides, and their fatty acid compositions, were determined by gas-liquid chromatography. There was a significant variation of lipid composition of the wax samples, and the author suggests that these variations affect the thermal and acoustic properties of the tissues. Some preliminary investigations into the relative melting point ranges of the lipids found in the organs containing the wax indicate that variations in melting points could act as a fine adjustment to the whales control over phase changes of its spermaceti organ.
[1 figure, 2 tables, 18 references] SW

6.15 [METHODS FOR MANUFACTURING A FISH PRODUCT]

Unilever NV (pat.)
Netherlands Patent Application 7,215,067 (1973) (In Dutch)
Food Science and Technology Abstracts 5, No. 10, 188, Abstract No. 10R479 (Oct. 1973)

A fish protein isolate suitable for use as human food is produced from fish waste material by decoloring while the protein material is in the nondissolved state, deodorizing by extraction with isopropyl alcohol, and deboning by comminuting and mechanically screening the fish waste material. Decoloring is carried out at a pH of 6.0-10.0 with an agent that contains hydrogen peroxide and sodium hypochlorite. Excess decoloring agent is removed with a reducing agent or by treatment with catalase. The isolated, white product obtained has a protein efficiency ratio slightly lower than casein. SW

6.15 CONTINUOUS ENZYMIC SOLUBILIZATION OF FISH PROTEIN CONCENTRATE. ENZYME RECYCLING STUDIES

Cheftel, C. (Lab. Biochim. Aliment., Univ. Sci. Tech. Languedoc, Montpellier, France)
Chemical Abstracts 79, No. 19, 114110x (Nov. 12, 1973)

6.190 (8.) THE COMPOSITION OF VARIOUS FISHERY PRODUCTS USED IN THE PRODUCTION OF ANIMAL FEEDS

Miller, David (College Park Fishery Products Technology Laboratory, National Marine Fisheries Service, NOAA, U.S. Dept. of Commerce, College Park, MD 20740)
Feedstuffs 45, No. 50, 29 (Dec. 3, 1973)

Data are given on the average composition of fish meals prepared from menhaden, anchovy (Peruvian and Chilean), herring (Atlantic and Norwegian), tuna, king crab, and blue crab, and of menhaden condensed fish solubles. Values are given for protein, ash, fat, moisture, calcium, phosphorus, sodium, potassium, magnesium, lysine, methionine, cystine, trytophan, histidine, arginine, threonine, valine, isoleucine, leucine, tyrosine, phenyalanine, aspartic acid, serine, glutamic acid, proline, glycine, alanine, iron, copper, zinc, manganese, chromium, boron, barium, strontium, aluminum, selenium, and metabolizable energy.

These data were already published with data on other feedstuffs in earlier issues of Feedstuffs. However, the author believed that a single table of analytical data on fishery products might be conveniently useful to animal nutritionists and feed formulators in view of the problems inherent in the worldwide shortage of fish meals. Reprints of the data may be obtained from the author's laboratory. [1 table, 10 references] FTP

6.31 REQUIREMENTS FOR ORGANIC SUBSTANCES IN SEAWEEDS

Fries, Lisbeth (Inst. Physiol. Bot., Univ. Uppsala, Uppsala, Sweden)
Chemical Abstracts 79, No. 4, 113173h (Nov. 12, 1973)

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6.195 (7.51)(1.85) VARIABILITY IN PROXIMATE ANALYSIS OF DIFFERENT PROCESSED SHRIMP MEALS

Meyers, Samuel P., James E. Rutledge, and Sunee C. Sonu (Dept. of Food Science, Louisiana State University, Baton Rouge, La.)
Feedstuffs 45, No. 47, 34-35 (Nov. 12, 1973)

Increasing interest is being shown in reclamation of shrimp processing wastes for use in animal diets. The increased interest is due to world shortages and high prices of other animal and plant protein commodities. In addition, there are increasing amounts of shrimp processing wastes available because of more stringent regulations governing plant discharges into the environment. This has resulted in a search for more economic utilization of these wastes. One of the problems in utilizing shrimp processing wastes for animal feed meal is the great variability in their nutrients and other factors depending on the sources of the processing wastes. The variability in nutrients present in shrimp wastes may be due to several factors: (1) species of shrimp, (2) spoilage--protein content is reduced by enzymes and autolytic and microbiological activity, and (3) diversity of procedures in processing shrimp--one process may leave more proteinaceous material in the waste than another process. Protein levels in shrimp meal may require correction in relation to the nonprotein nitrogen contributed by the chitin of the shells present. Kjeldahl determinations include nitrogen from protein and chitin. This can be the basis for an erroneously high protein level printed on the product tag. An example of differentiating crude protein from chitin nitrogen is presented. Shrimp meal made of heading wastes from the large spot shrimp showed a

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6.31 SEAWEEDS: THEIR PRODUCTIVITY AND STRATEGY FOR GROWTH

Mann, K. H. (Dalhousie University, Halifax, Nova Scotia, Canada)
Science 182, No. 4116, 975-981 (Dec. 7, 1973)

Seaweeds are a unique form of plant life; they are attached to rocky substrates by a holdfast and take their nutrients from the surrounding water. The nutrients are constantly renewed by the action of winds, tides, and upwelling of deeper water. The growth of seaweeds is richer below the low-tide level (the sublittoral) than in the intertidal areas of the coastal zone. The intertidal zone is inhabited by the fucoids. [Fucus is a genus of algae, with olive-brown fronds and air bladders.] The dominant seaweeds in the sublittoral are the laminarians or kelps. [Laminaria is a genus of brown algae and is a source of commercial kelp.] Kelps grow from below the low tide level to depths of 20 to 30 m in clear water, and they may extend 5 to 10 km from the coastline.

In experiments on productivity at St. Margaret's Bay, Nova Scotia, small holes were punched at 10-cm intervals along the blades of L. longicruris, L. digitata, and Agarum cribrosum. By observing the movement of the holes, growth of the blade was shown to be almost balanced by erosion at the tip. A 2-year record of growth indicated that the biomass of new tissue produced annually was 20 times the initial biomass of the blade. Macrocystis is the genus of the giant kelp which develops very large biomasses off the coast of California and in the Indian Ocean. Intertidal seaweeds such as Fucus and Ascophyllum may have production comparable to the kelps. The author suggests that seaweed productivity is as high or higher than some of the most productive terrestrial systems.

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6.195 (7.51)(1.85)

crude protein value of 49.87% with an apparent chitin protein value of 3.74%. The final corrected crude protein value was 46.13%. The differences in protein value are important in digestibility studies and consequent value of the shrimp meal as a feedstuff.

The authors describe a method for determining crude protein in shrimp meal with corrections for the amount of nitrogen contributed by the chitin. The method consists of acetone extraction, formic acid and caustic digestion, followed by Kjeldahl determination. A step-by-step description of the method is provided in this article. An alternative procedure is the examination of the meal for fiber content as an indicator of chitin content in the method by Lovell [Ag. & Food Chem. 16, 204 (1968)]. The authors suggest that increased quality of the shrimp wastes and standardization of proximate analysis for protein levels will contribute toward making shrimp meal a valuable commodity in the feedstuff market.
[5 tables] SW

6.190 NUTRITIVE VALUE OF ENZYMIC PREDIGESTION OF FISH PROTEIN CONCENTRATE FOR YOUNG CALVES (6.55)

Wilson, Kenneth Owen (Texas A. & M. Univ., College Station, Texas)
Chemical Abstracts 79, No. 9, 52082d (Sept. 3, 1973)

6.30 (9.6) A BIBLIOGRAPHY OF INTEREST IN THE UTILIZATION OF VASCULAR AQUATIC PLANTS

Boyd, C. E. (Dep. Fish. & Allied Aquacult., Agric. Exp. Stn., Auburn Univ., Auburn, Ala.)
Econ. Bot. 26, No. 1, 74-84 (1972)
Aquatic Sciences & Fisheries Abstracts 3, No. 10, 1, Abstract No. 3Q9944F (Oct. 1973)

6.32 FATTY ACID CONTENT IN SOME PHAEOPHYCEAE, CHLOROPHYCEAE, AND RHODOPHYCEAE OF THE HIGH ADRIATIC SEA

Cerma, E., and B. Stanchev (Inst. Mercerol., Univ. Trieste, Trieste, Italy)
Chemical Abstracts 79, No. 15, 89252k (Oct. 15, 1973)

6.31

Laminaria and Agarum off the coast of eastern Canada, grow rapidly throughout the winter at low light intensity and temperatures near 0° C. An explanation for the growth of Laminaria off eastern Canada in the winter season suggests a combination of mobilized reserves and heterotrophy (taking up nutrients from the surrounding water).

In the studies in St. Margaret's Bay, the main herbivores were sea urchins and the periwinkle. They consumed 10% of seaweed production. The remaining 90% entered various detritus food chains either as particulate or dissolved organic matter. More than half of the dry weight of the blades consists of soluble carbohydrates and ash. Most dissolved organic matter released by seaweeds is either rapidly taken up by bacteria on their surfaces or accepted into the surrounding water.

Sea urchins are responsible for areas bare of seaweeds. Off California, sea urchin populations are controlled by sea otters. In waters near Seattle, Wash., sea urchins are controlled by the starfish Pycnopodia. Off eastern Canada, the sea urchin population is controlled by the lobster. Population explosions of sea urchins and consequent overgrazing of kelp beds is due to the reduced population of lobsters off eastern Canada and the United States, and low numbers of sea otters off the coast of California.
[5 figures, 2 tables, 75 references] SW

6.32 STRUCTURAL COMPONENTS OF ALGINIC ACID. I. CRYSTALLINE STRUCTURE OF POLY-β-D-MANNURONIC ACID. RESULTS OF X-RAY DIFFRACTION AND POLARIZED INFRARED STUDIES

Atkins, E. D. T., I. A. Nieduszynski, W. Mackie, K. D. Parker, and E. E. Smolko
(H. H. Wills Phys. Lab., Univ. Bristol, Bristol, England)
Chemical Abstracts 79, No. 19, 112583e (Nov. 12, 1973)

6.32 EXTRACTION AND DETERMINATION OF MICROALGAL CAROTENOIDS

Paoletti, C., and R. Materassi (Ist. Microbiol. Agrar. Tecn., Univ. Firenze, Florence, Italy)
Chemical Abstracts 79, No. 15, 89184q (Oct. 15, 1973)

6.32 ALKALI-SOLUBLE PROTEINS IN MARINE ALGAE

Arasaki, Teruko, and Noriko Mino (Kobe Yamate Women's Junior Coll., Kobe, Japan)
Chemical Abstracts 79, No. 19, 113232b (Nov. 12, 1973)

6.4 ADVANCES IN BAR SOAP TECHNOLOGY

Jungermann, E. (Armour-Dial, Inc., Greyhound Tower, Phoenix, AZ 85077)
Journal of the American Oil Chemists' Society 50, No. 11, 475-478 (Nov. 1973)

Recent trends in bar soap technology are reviewed in this article. More than 80% of the toilet soaps sold in the United States are prepared from a mixture of tallow and coconut oil. The other toilet soaps are prepared from mixtures of soaps, synthetic detergents, and other builders. Of the 500 million lb/yr of soap manufactured 51% are deodorant soaps, 20% complexion, 16% floating, and 13% miscellaneous. The process of soap making begins either in direct saponification of fat with caustic soda, the old-fashioned kettle soap process, or by the continuous neutral fat saponification processes. Another method is the conversion of fats into fatty acids and glycerol continuously under a high pressure fat splitting process. The crude fatty acids are then distilled and neutralized. All of the processes described result in a neat or anhydrous soap containing 65% to 70% soap. The neat soap is dried and converted into pellets containing 10% to 15% moisture. The finishing operation includes "working" and mixing the pellets by milling and plodding (or blending) with the addition of perfumes, colors, or germicides. The soap is extruded after these steps in the form of a continuous rod. The continuous soap rod is then cut into blank bars, stamped, and wrapped.

New equipment and processing techniques have been developed to improve the soapmaking operations. These include high caustic-high solids saponification (saponification with minimum amounts of water), high-speed finishing equipment, more efficient dryers, and better pollution controls. Multicolored and marbleized soaps have become important items in the market and new blending equipment has

6.54 (0.7) ADEQUACY OF SPUN-SOY PROTEIN CONTAINING EGG ALBUMIN FOR HUMAN NUTRITION

Turk, R. E., P. E. Cornwell, M. Dianne Brooks, and C. E. Butterworth, Jr. (Nutrition Program, University of Alabama School of Medicine, Birmingham, AL 35233)
Journal of the American Dietetic Association 63, No. 5, 519-524 (Nov. 1973)

Vegetable protein products that simulate the appearance, texture, and flavor of meat are now prepared commercially. These products may be prepared by extrusion process, and one type is prepared in edible fiber form by a process similar to that used in the spinning of textile fibers. Little information is available concerning the value of these vegetable protein products for human nutrition. The present study was carried out to test the efficiency of a commercially available spun-fiber soy protein product containing egg albumin in maintaining nitrogen balance at varied levels of intake in eight healthy teen-agers and young adults. Egg albumin is added to the product during commercial processing to aid in spinning the fibers; it represented slightly less than one-third of the total available dietary protein used in these studies. Nitrogen balance studies were carried out, under metabolic ward conditions, on the eight subjects during five consecutive 1-week periods in which spun-soy protein food constituted the principal source of dietary nitrogen. The results indicated that spun fiber foods of the type used in this test represent a high-quality protein for teen-agers and adults. Furthermore, although the amount of egg protein alone in the fiber would have been inadequate, it undoubtedly enhanced the nutritional quality of the finished product. The composition of chicken-style soy protein product is shown in the table that follows.
[1 figure, 4 tables, 20 references] FTP

6.54 PROTEIN HYDROLYSATE FROM FISH WASTE

Tarky, W., O. P. Agarwala, and G. M. Pigott (Institute for Food Science & Technology, College of Fisheries, University of Washington, Seattle, WA 98195)
Journal of Food Science 38, No. 6, 917-918 (Sept.-Oct. 1973)

This paper describes a method for recovering protein material from the waste of a fish filleting operation. The entire waste left over from filleted English sole (Parophrys vetulus) was used in the experiments. The ground waste was hydrolyzed with pepsin, and the hydrolysate was separated by centrifugation at 12,000 g for 10 min. The supernatant was heated at 80° C (to inhibit the enzyme), neutralized with 30% NaOH, and filtered. The filtrate was concentrated to 30% solids and then spray dried. The resulting material contained about 80% protein and 22% ash. The product was creamy white, nonhygroscopic, and soluble in water; it had a slightly salty and bitter flavor. The hydrolysate alone showed a poor protein efficiency ratio (PER) in feeding tests; this was probably due to a low level of tryptophan. However, when the hydrolysate was mixed with casein (1:1, based on protein nitrogen content) the mixture gave a PER value equivalent to that of casein.

The authors indicate that a pilot plant using this process has been constructed, and tests will be conducted on the hydrolysate to determine the commercial feasibility of the process.
[1 figure, 3 tables, 6 references] FTP

6.4

been designed for their manufacture. Lime soap dispersants for use with soap have been investigated. These include amphoteric sulfonates, sulfons, sulfonamides, sulfonated phenyl sulfostearic acid derivatives, alpha-sulfo fatty acids and esters, magnesium thiodisuccinic acid, vicinal acylamido sulfonates, hydrogenated olefin sulfonates, and alpha olefin sulfonates. The deodorant-antibacterial soap ingredients have been modified by actions of the Government to exclude hexachlorophene. Future regulatory actions on this part of the soap industry are probable.
[8 figures, 1 table, 69 references] SW

6.37 PRODUCTION OF FOOD AND FODDER YEASTS FROM SEAWEED

Cho, Han-Ok, Chong-Uuk Rhee, and Soo-Kyo Chae (Radiat. Res. Inst. Agric., Seoul, S. Korea)
Chemical Abstracts 79, No. 19, 114016v (Nov. 12, 1973)

6.54 FISH PROTEIN

Sharpe, K. H. (pat.)
Canadian Patent 927,663
Food Technology 27, No. 10, 108 (Oct. 1973)

Comminuted fish material is soaked in a weak solution of formaldehyde. The material is then partially dried, frozen, thawed, and further dried to yield a protein substance. FTP

6.54 MARINE PROTEIN EXTRACTION

Woodbridge, R. G. (pat.)
U.S. Patent 3,754,927
Food Technology 27, No. 12, 88 (Dec. 1973)

Edible protein products are produced by extracting marine animals with solvent in the presence of ammonia or ammonium ions. FTP

6.36 (6.35) DENTIFRICES

Sugasuma, Nobuo, and Yutaka Ake (Lion Dentifrice Co., Ltd.) (pat.)
Japan. Kokai 73 56,835 (Aug. 9, 1973)
Chemical Abstracts 79, No. 18, 108009e (Nov. 5, 1973)

6.36 UTILIZATION OF NATURAL POLYSACCHARIDE GUMS AND THEIR TECHNICAL PROBLEMS

Katsui, Tsugio, and Masao Sano (Organo Co., Ltd., Tokyo, Japan)
Chemical Abstracts 79, No. 15, 90547s (Oct. 15, 1973)

6.54 (0.7)

Item and (unit)	Composition of chicken-style spun-soy protein product	
	Frozen	Canned
Protein (g/100 g)	21.4	10.3
Fat (g/100 g)	18.5	9.5
Carbohydrate (g/100 g)	2.7	1.5
Amino acids (g/100 g of protein)		
Lysine	5.5	
Histidine	2.5	
Arginine	8.6	
Aspartic acid	11.2	
Threonine	3.1	
Serine	4.3	
Glutamic acid	19.0	
Proline	5.0	
Glycine	3.6	
Alanine	3.5	
Valine	4.2	
Methionine	1.2	
Isoleucine	4.4	
Leucine	7.5	
Tyrosine	5.5	
Phenylalanine	5.0	

6.54 EFFECT OF TEMPERATURE ON LIPID EXTRACTION AND FUNCTIONAL PROPERTIES OF FISH PROTEIN CONCENTRATE (FPC)

Dubrow, D. L., (College Park Fishery Products Technology Lab., National Marine Fisheries Service, NOAA, College Park, MD 20740), A. Kramer, and A. D. McPhee
Journal of Food Science 38, No. 6, 1012-1015 (Sept.-Oct. 1973)

The FPC prepared by isopropyl alcohol extraction of whole fish at 70°-80° C [Bureau of Commercial Fisheries Fishery Leaflet No. 584 (1966)] tends to show relatively poor functional properties. The functional properties of a food ingredient are those that provide specific desirable characteristics to a processed food involving such characteristics as solubility, wettability, emulsifying ability, and water dispersibility. The purpose of the present study was to determine the effect of temperature of the isopropyl alcohol extraction of whole fish on the extractability of the lipid and on the functional properties of the FPC produced.

Whole red hake (Urophycis chuss) were countercurrent extracted in five stages with isopropyl alcohol at temperatures of 20°, 40°, or 50° C to produce FPC. Analyses were then made on the resulting FPC to determine residual lipid content, lipid composition, protein solubility, suspendible solids, emulsifying capacity-stability, wettability, pH, and reflectance.

The five-stage countercurrent extraction of whole red hake with isopropyl alcohol at 20° C reduced the residual fish lipid level in the FPC to 10%. Extraction at 40° or 50° C required four or three stages, respectively, to produce FPC with a residual lipid level of 0.5% or less. The FPC produced by extracting the red hake at 20° C had better functional properties than those processed at

7.0 (7.42)(7.599) SEPARATION AND ANALYSIS OF ORGANIC-BOUND AND INORGANIC ARSENIC IN MARINE ORGANISMS

Lunde, Gulbrand (Central Institute of Industrial Research, Forskningsveien 1, Blindern, Oslo 3, Norway)
Journal of the Science of Food and Agriculture 24, No. 9, 1021-1027 (Sept. 1973)

Arsenic is present in marine organisms as both fat-soluble and water-soluble arseno-organic compounds. Such organically bound arsenic compounds are probably less toxic. The purpose of this study was to develop a method for separating stable organic-bound arsenic from inorganic arsenic in marine organisms, allowing the content of arsenic to be determined in each of the two fractions. The methods used were neutron activation and X-ray fluorescence analyses.

Separation of the two forms of arsenic compounds was achieved by volatilizing the inorganic arsenic as arsenic trichloride by treatment with 6.6 N HCl and the subsequent distillation at 100° C. The arseno-organic compounds are stable under these conditions.

Various samples of fresh fish, fish extracts, fish meal, seaweed, mussels, and shrimp were extracted by the procedure and the organic-bound, inorganic, and total arsenic were determined. The hydrochloric acid treatment reduces the total arsenic in the samples by about 0.5 to 3 p/m and the reduction seems to be independent of the amount of arsenic present in the marine samples.
[3 figures, 1 table, 12 references] FTP

6.55 (0.8) INDUSTRIAL WASTE AS FEED

Anonymous
Feedstuffs 45, No. 48, 18 (Nov. 19, 1973)

This article is a summary of a report that appeared in Acta Agric. Scand. (further definition of the reference source was not given) by Olav Herstad and Harald Hvidsten. The lignoprotein recovered from the waste water from a fish processing factory was used successfully in poultry rations. The lignoprotein was obtained by treating the fish factory waste water with lignosulfonic acid (patented method). The researchers found that about 5 to 6% of the lignoprotein could be used in poultry rations. Some of the chicks fed the rations containing lignoprotein showed changes resembling vitamin E deficiency. Subsequent analysis of the rations containing lignoprotein revealed reduced levels of vitamin E. Since all the rations contained vitamin supplements, it appeared that the rations containing lignoprotein might be less stable. Composition of herring solubles [meal?] and lignoprotein is shown in the table that follows.
[1 table] FTP

7.53 A RAPID DIELECTRIC MEASUREMENT OF FAT IN FISH AND FISH PRODUCTS

Storey, R. M., and M. L. Windsor (Ministry of Agriculture, Fisheries and Food, Humber Laboratory, Hull, England)
Journal of Food Technology 8, No. 3, 259-268 (Sept. 1973)

The purpose of this study was to develop an instrument for the rapid measurement of fat in foods that would give results comparable to that obtained by the soxhlet extraction procedure. Inasmuch as the instrument was to be used for quality control, it was designed to be rugged, direct reading, and simple to operate. The present work was limited to the measurement of the oil content of certain fish and fish products. The operating principle of the instrument is based on the measurement of changes in the dielectric constant of a solution of fat in an organic solvent. In the present procedure, developed for use of the instrument, the fish and fish products were extracted with θ-dichlorobenzene. The construction of a test cell, the electronic circuitry, and the test procedures are described. Data are given on the results for the oil content for herring, kipper (smoked herring), and fish meal for both the dielectric method and the soxhlet method. In general, the soxhlet method gave higher results than did the dielectric method; the oil content values by the soxhlet method were about 1 percentage point higher than the values obtained by the dielectric method.
[2 figures, 2 tables, 3 references, 1 appendix] FTP

6.55 (0.8)

Items	Herring solubles	Lignoprotein
Dry matter (%)	91.8	93.2
Crude protein (%)	69.5	70.5
True protein (%)	63.1	61.2
Crude fat (%)	9.9	9.1
Ash (%)	11.1	14.0
Calcium (%)	2.29	3.61
Phosphorus (%)	2.05	2.31
Sodium chloride (%)	0.87	0.92
Amino acids (as % of protein)		
Cystine	1.04	1.08
Aspartic acid	9.02	8.96
Methionine	3.16	3.38
Threonine	4.58	4.68
Serine	4.09	4.02
Glutamic acid	14.07	14.47
Glycine	5.60	5.54
Alanine	6.29	6.22
Valine	5.56	5.13
Isoleucine	4.72	4.35
Leucine	6.89	6.64
Tyrosine	2.10	2.22
Phenylalanine	3.55	3.84
Lysine	7.31	7.15
Histidine	2.23	2.18
Arginine	5.01	5.29

7.8 (7.599) A QUICK METHOD FOR THE DETERMINATION OF TRIMETHYLAMINE OXIDE IN FISH TISSUE

Chung, Chung-Young, Hsueh-Liang Chen, Chyuan Yao Wu, and Shao Kuo Huang (Fisheries Technol. Dept., Taiwan Provincial Kaoshung Junior College of Marine Technology)
Journal of the Fisheries Society of Taiwan 2, No. 1, 60-68 (June 1973) [In Chinese; abstract in English]

A rapid and reliable colorimeteric method for determining trimethylamine oxide (TMAO) in fish tissue was developed. Samples of homogenated fish muscle are treated with 5% trichloroacetic acid (TCA) and filtered. Three volumes of the filtrate are mixed with one volume of reagent (0.3% fuchsin, 2 parts; 6% $NaHSO_3$, 1 part; and 4N H_2SO_4, 2 parts) in a sealed tube. The tube is then heated for 10 min in a boiling water bath and then is cooled. The absorbance of the resulting pigment is measured at 580 nm. The content of TMAO is calculated from a standard curve prepared from known samples of TMAO in 5% TCA. An analysis can be completed in about 30 min. The detectable limit of TMAO is 0.002 mg/ml of TMAO-nitrogen.
[10 figures, 17 references] FTP

7.595 ANALYSIS AND MEASUREMENTS OF ANTIOXIDANTS IN FATS

Mordret, F. (Ec. Super. Corps Gras., Paris, France)
Chemical Abstracts 79, No. 18, 106309d (Nov. 5, 1973)

6.54

40° or 50° C. Increasing the temperature of extraction decreased the protein solubility and suspended solids and increased the pH of the FPC. Wettability was poor for all samples of FPC.
[1 figure, 4 tables, 27 references] FTP

6.54 PROTEINACEOUS FOOD PRODUCT

Unilever N.V. (pat.)
Netherlands Appl. 72 15,299 (May 14, 1973)
Chemical Abstracts 79, No. 15, 90669h (Oct. 15, 1973)

7.44 PARTIAL RECOVERY OF NITRITE NITROGEN BY THE KJELDAHL PROCEDURE IN MEAT PRODUCTS

Sebranek, J. G., and R. G. Cassens (Dept. of Meat & Animal Science, University of Wisconsin, Madison, WI 53706), and W. G. Hoekstra
Journal of Food Science 38, No. 6, 1085-1086 (Sept.-Oct. 1973)

Use of the conventional Kjeldahl procedure for crude protein in cured meats might be expected to include some nitrogen from nitrite and/or nitrate, but the recovery would not be quantitative (because some forms of nitrogen are difficult to convert to ammonia). In this study, the effect was examined of adding nitrite to meat on the results obtained by Kjeldahl analysis. Fresh pork was used; the prepared pork sample and nitrite (in solution) were added directly to the micro Kjedahl flask. The nitrite in the mixture was partially recovered by the conventional Kjeldahl nitrogen procedure, but the amount recovered depended upon the amount of nitrite present. At low levels of nitrite, the recovery was 80-90%; at high levels, the recovery was only 25-30%.
[1 figure, 10 references] FTP

7.0 (7.44) REDUCING MERCURY POLLUTION FROM KJELDAHL DETERMINATION OF TOTAL NITROGEN

Worsham, H. M., and B. G. Blackmon (South Hardwoods Lab., Forest Serv., Stoneville, Miss.)
Chemical Abstracts 79, No. 18, 107871t (Nov. 5, 1973)

7.80 PHYSICAL REQUIREMENTS FOR SENSORY TESTING

Larmond, Elizabeth (Food Research Institute, Agriculture Canada, Ottawa, Canada)
Food Technology 27, No. 11, 28, 30, 32 (Nov. 1973)

Sensory testing is involved with human evaluation and measurement of physical stimuli relating to food. The effects of environment must be controlled to prevent influencing the judgment of the individuals of a test panel; consequently, the individuals on a test panel should be provided with the optimal setting for procuring unbiased judgment. Odors from food preparation, smoking, and cosmetics should be avoided. The lighting in the test area should not influence the appearance of the samples. Colored or dimlighting has less effect on experienced judges than on inexperienced judges.

A well-equipped kitchen is required for sample preparation, and the area should be adequately ventilated to remove cooking odors. There should also be sufficient counter space for assembling samples for presentation. The samples tested must be typical of the product, and the method used in preparation of the product must be typical in normal use. Panelists are influenced by irrelevant characteristics of test samples; therefore, the samples from different treatments should be identical in every characteristic except the one being judged. Some products such as spices and sauces may require diluents or carriers before they are tested. These additives may be a source of error in judging the product. For acceptance tests samples should be served at the temperatures they are normally eaten. Serving temperatures for many foods are suggested by the Sensory Evaluation Committee of ASTM [ASTM STP 434. American Society for Testing Materials,

7.86 (0.5) EVALUATION OF A FLUORESCENT ANTIBODY-ENRICHMENT SEROLOGY COMBINATION PROCEDURE FOR THE DETECTION OF SALMONELLAE IN CONDIMENTS, FOOD PRODUCTS, FOOD BY-PRODUCTS, AND ANIMAL FEEDS

Hilker, John S., and Myron Solberg (Rutgers, State University, Dept. of Food Science, College of Agriculture and Environmental Science, New Brunswick, NJ 08903)
Applied Microbiology 26, No. 5, 751-756 (Nov. 1973)

The procedure described in the Bacteriological Analytical Manual (BAM) [R. P. Elliott, ed., U.S. Food and Drug Administration, Washington, D.C. (1966)] requires 4 to 6 days to test food material for the presence of salmonellae. Several rapid procedures for the detection of Salmonella have been proposed including the enrichment serology (ES) procedure and the fluorescent antibody (FA) technique. In the present study, the reliability of the ES, FA, and a combination of ES and FA procedures were compared with the procedure outlined in the BAM. One hundred and twenty-six samples from 22 different products were examined. The BAM procedure was used as the reference standard. The data indicated that incorporating positive FA and ES results in a combination FA-ES technique gave FA-ES positives that were statistically equivalent to BAM positives.
[1 figure, 3 tables, 18 references] FTP

8. ANALYSIS OF TRACE ELEMENTS, PHOSPHORUS AND SULPHUR, IN THE LIPID AND THE NON-LIPID PHASE OF HALIBUT (HIPPOGLOSSUS HIPPOGLOSSUS) AND TUNNY (THUNNUS THYNNUS)

Lunde, Gulbrand (Central Institute for Industrial Research, Forskningsveien 1, Blindern, Oslo 3, Norway)
Journal of the Science of Food and Agriculture 24, No. 9, 1029-1038 (Sept. 1973)

Considerable interest exists in heavy metal content of fish and other marine organisms relative not only to environmental problems but also to the fact that certain trace elements are important to the growth and development of living organisms. The level of trace elements in marine organisms may vary depending upon pollution and natural sources of these elements in the environment. Also, the age of the marine organism may have some bearing on the level of accumulation of the elements. Samples were taken from old tunny caught off the west coast of Norway, and samples were taken from old and young halibut obtained from four other locations. The homogenized samples were defatted by extraction with hexane followed by extraction with hexane-isopropanol (1:1) mixture. The hexane phase was separated from the isopropanol/water phase. The hexane extracts were evaporated to obtain the lipids. The defatted material was boiled in distilled water, and the insoluble and the aqueous phase were separated by filtration. The insoluble phase (meal) and the water-soluble phase (aqueous phase) were dried at 90° to 100° C for 6 h. The analyses were made on the dried, defatted meal, the dried solids from the aqueous phase, and the lipids obtained from the hexane extract and from the hexane/isopropanol extract.

8.42 HEAVY METAL CONTENTS OF FISHES CAUGHT IN KEELUNG HARBOR

Jeng, Sen Shyong, Yao-Wen Huang, Yi Sheng Lee, Guoo-Shyng Wang, and Shwu-Jane Jeng
Journal of the Fisheries Society of Taiwan 2, No. 1, 78-81 (June 1973) [In Chinese; abstract in English]

Data are given on the As, Cd, Cu, Pb, Hg, Ni, and Zn content of the muscle and viscera of five species of fish and on the edible portion of three species of crab, shrimp, and oyster. The results obtained for the fish, crabs, and shrimp were in the range of values ordinarily found for the species. The oyster, however, was found to be heavily contaminated with copper (426 p/m, wet basis) and zinc (1,452 p/m, wet basis).
[1 figure, 2 tables, 8 references] FTP

8.

The lipid phase of the samples of halibut and tunny contained arsenic, bromine, selenium, zinc, iron, phosphorus, and sulfur and the nonlipid phase contained cadmium, lead, zinc, copper, selenium, iron, arsenic, mercury, and sulfur. Data on the trace elements, phosphorus, and sulfur contents in the lipid and nonlipid phases are given in the various tables of the report.

A surprisingly high content of sulfur was found in the lipid phase, and the author suggests this might indicate a new group of lipids and possibly a specific biological function. Also, the defatted meal showed a rather constant ratio of selenium content to sulfur content while the lipid phase showed variations in the corresponding ratio; apparently the lipid-soluble selenium compounds were formed independently of the sulfur organic compounds. The cadmium to zinc ratio was lower than that for seawater (confirming previously reported work). The mercury to selenium ratio in the tunny and halibut showed considerable variations. It has been proposed that selenium acts as a detoxification agent against methyl mercury and that the fish has an ability to regulate the uptake of selenium corresponding to the level of methyl mercury in the fish. However, the author points out that his results suggest that this view may be dubious.
[2 figures, 4 tables, 14 references] FTP

8.0 (1.89) CHEMICAL COMPOSITION OF ECHINODERM MEAT

Nesedkina, E. A., Yu. I. Kas'yanenko, and T. R. Slutskaya (U.S.S.R.)
Chemical Abstracts 79, No. 19, 114112z (Nov. 12, 1973)

8.42 (9.19)(0.7) LEVELS OF COPPER, NICKEL, RUBIDIUM, AND STRONTIUM IN INSTITUTIONAL TOTAL DIETS

Murthy, Gopala K. (Food and Drug Administration, U.S. Dept. of Health, Education, and Welfare, Cincinnati, OH 45226), Ulysses S. Rhea, and James T. Peeler
Environmental Science & Technology 7, No. 11, 1042-1045 (Nov. 1973)

A description of the samples and their method of collection was published in a previous report by the authors [Environ. Sci. Technol. 5, 436-442 (1971)]. The range of averages of trace element contents of the diets of institutionalized children, aged 9 to 12, from 28 U.S. cities, in milligrams per kilograms was: copper, 0.438-0.873; nickel, 0.140-0.321; rubidium, 0.601-2.338; and strontium, 0.319-0.957. [The earlier paper by the authors contained data on the antimony, cadmium, chromium, cobalt, manganese, and zinc contents of the same total diets.] The consumption of food by the children ranged from 1.18 to 2.55 kg/day, and the milk content of the diet ranged from 9.5-63.8%. The minerals contributed by the drinking water were not included in this study. There were significant variations in the trace element contents of the diets by season and by geographical area. The copper level was slightly higher during the summer, rubidium and strontium levels were higher during spring and autumn, and nickel levels did not appear to show any trend.
[1 figure, 2 tables, 38 references] FTP

7.80

Philadelphia (1968)]. Serving containers should be colorless or white, and they should be identical for each sample to prevent bias from these sources. The amount of the sample should be constant throughout the test. The ASTM reference cited above suggests sample quantities for discrimination and preference testing.

Because of psychological or physiological effects, the order of presentation of the samples to each panelist is randomized or balanced. This will reduce the bias provided by "good" samples following "poor" ones. Each panelist should be provided with taste-neutral water at room temperature for oral rinsing between samples. However, any method for removing flavor from the mouth should be consistently followed after each sample is tested.

By following these suggestions many factors that affect judgment can be avoided, and the results of the sensory tests will be more reliable.
[1 figure, 10 references] SW

7.8 AUTOMATIC ANALYSIS OF TRIMETHYLAMINE IN FISH MUSCLE

Kato, Noboru, and Hitoshi Uchiyama (Tokai Reg. Fish. Res. Lab., Tokyo, Japan)
Chemical Abstracts 79, No. 19, 114039f (Nov. 12, 1973)

8.59 (8.42)(9.19) GAS CHROMATOGRAPHIC DETERMINATION OF METHYL MERCURY IN FISH, SEDIMENT, AND WATER

Longbottom, James E., Ronald C. Dressman, and James J. Lichtenberg (National Environmental Research Center, Environmental Protection Agency, Cincinnati, OH 45268)
Journal of the Association of Official Analytical Chemists 56, No. 6, 1297-1303 (Nov, 1973)

Methyl mercury is extracted as the bromide salt from fish and sediment samples and as the chloride salt from water. All of the extracts undergo a common cleanup procedure that results in the conversion of methyl mercury to the iodide salt for analysis by electron capture gas chromatography. Recoveries from spiked samples averaged 88.5% for the water samples, 95.5% for the fish (perch) samples, and 96.3% for the sediment samples.
[2 figures, 1 table, 12 references] FTP

8.53 LIPID-SOLUBLE COMPONENTS OF MEAT FLAVORS/ODORS AND THEIR BIOCHEMICAL ORIGIN

Sink, J. D. (Division of Food Science and Industry, Pennsylvania State University, University Park, PA 16802)
Journal of the American Oil Chemists' Society 50, No. 11, 470-474 (Nov. 1973)

Studies of meat by other investigators suggest that the lean portion provides the basic meaty flavor that is almost indistinguishable between beef, pork, and lamb; the fat portion contributes the unique flavor that characterizes these meats. The same findings have been applied to chicken and turkey.

Of the compounds associated with meat flavor the carbonyls have been most often identified. [Carbonyls are compounds containing the radical R-C=O where R may either be a carbon chain structure found in fatty acids or a ketone. Abstracter's note] Unsaturated 18-carbon chain fatty acids as precursors of carbonyls was established by S. Patton, I. J. Barnes, and L. E. Evans [JAOCS 36, 280 (1959)]. Carbonyl compounds have been associated with flavor changes that occur in aging beef. Other studies were performed on the amount of carbonyls present in beef at time of slaughter and after 14 days of aging. The total carbonyls present after 14 days increased three times over the number present immediately after slaughter, and the monocarbonyls (mostly alk-2-ones or methyl ketones) increased fourfold. The flavor significance of these increases in carbonyls after aging has not been completely established.

The odor obtained from heating the flesh of intact male swine tissue or other swine tissue containing sex odor was investigated. This odor has been described as onionlike, perspirationlike, and urinelike. The odor was associated with the

9.12 (1.85)(1.0117) PRIMARY FACTORS WHICH INFLUENCE COMMERCIAL SHRIMP PRODUCTION IN COASTAL LOUISIANA

Barrett, Barney B., and Marilyn Cannon Gillespie
Technical Bulletin No. 9, Louisiana Wild Life and Fisheries Commission, Oysters, Water Bottoms and Seafoods Division, New Orleans, La. (Aug. 1973), 28 pp.

The purpose of this study was to examine (1) how rainfall and the local river systems affect the Louisiana estuarine ecosystem and (2) how environmental factors such as temperature and salinity influence shrimp production in the coastal waters of Louisiana. Data on shrimp production, river discharge rates, water acreage, salinity, water temperature, and rainfall were obtained from various Federal and State government agency sources.

The Barataria-Caminada Bay complex was used as an index area. The total number of hours of water temperature below 20° C occurring after the first week in April appears to be a critical factor in the survival of brown shrimp. If the number of hours below 20° C is 100 or more, production of brown shrimp in the area will be less than 0.6 million lb; if between 33 and 99 h, production will average between 0.6 and 0.8 million lb; and if less than 33 h, production will be greater than 0.9 million lb.

Salinity of the water appears to be critical in the distribution and population success of brown shrimp; they require salinities greater than 10 p/t for a successful season. It appears, from the data on the Barataria-Caminada Bay area, that a salinity of 19 p/t may be close to the optimum salinity requirement for brown shrimp.

9.11 (0.8) A DIGITAL RECORDING SYSTEM FOR MARINE EXPERIMENTATION

Vandiver, J. Kim
Technical Report WHOI-73-63, Woods Hole Oceanographic Institution, Woods Hole, MA 02543 (Sept. 1973), 29 pp.

Small scale marine experiments are often seriously restricted by current methods of data storage. A bell jar placed on the sea bottom to measure and record oxygen productivity is an example. The choice of recording equipment has been generally limited to magnetic tape or strip chart recorder. Both require bulky, watertight packaging that must be opened periodically for servicing and data retrieval. Flooded instruments are an inevitable result.

One alternative is to continuously transmit the data by acoustic telemetry. This still requires a person or recording mechanism on site 24 hours per day. Recent availability of random access digital memories on large scale integrated circuit chips has provided a low cost, easily packaged alternative. These allow data to be accumulated in a form that is readily available for nondestructive readout. Transmission over the telemetry link can then be scheduled at the convenience of the experimenter.

The circuit that is described in the following report is a digital data recording package, complete with all necessary input, output and control lines. It is capable of storing 64, 8 bit binary numbers, such as oxygen measurements. If one measurement were stored every 22.5 minutes, then 24 hours of data could be stored in the memory.

9.13 (9.16) ABSORPTION BY CHANNEL CATFISH OF EARTHY-MUSTY FLAVOR COMPOUNDS SYNTHESIZED BY CULTURES OF BLUE-GREEN ALGAE

Lovell, Richard T., and Lewis A. Sackey (Dept. of Fisheries and Allied Aquacultures, Auburn University, Auburn, AL 36830)
Transactions of the American Fisheries Society 102, No. 4, 774-777 (Oct. 1973)

Certain drinking waters taken from water-supply reservoirs may often show a characteristic "earthy-musty" odor and flavor. The same odor and flavor may appear in fish taken from natural or impounded waters. The organisms that cause this odor and flavor are species of actinomycetes and blue-green algae. These species are capable of producing the earthy-musty smelling metabolite geosmin. The purpose of the present study was to determine the capability of certain blue-green algae to impart the earthy-musty flavor to the flesh of channel catfish.

Small (50 g) channel catfish were held in stainless-steel tanks (150 l) containing dense masses of either Symploca muscorum or Oscillatoria tenuis (blue-green algae).

Within 2 days the channel catfish acquired the characteristic earthy-musty flavor similar to the odor of the algae. The intensity of the flavor in the fish reached a maximum after 10 days. When the channel catfish, which had been in the tanks containing algae for 14 days, were transferred to a tank of flowing, charcoal-filtered water, the earthy-musty flavor in the fish disappeared after 10 days. Catfish that were held in tanks containing the algae-free filtrate from the algae culture tanks developed the off-flavor also, but at a slower rate. They probably absorbed the earthy-musty flavor across their gill membranes.
[1 figure, 2 tables, 15 references] FTP

9.11 (0.8)

Data retrieval can be accomplished by retrieving the instrument, by daily acoustic transmissions that are regulated by a digital clock in the instrument package, or by acoustic transmission on command from a coded acoustic source operated on the surface.

Data output consists of 64, 8 bit numbers, beginning with the most significant bit (MSB) of the oldest number and ending with the least significant bit (LSB) of the most recent number. Acoustically the individual bits might be high and low tones, corresponding to 1 and 0 logic states. Provision is made for separating each 8 bit number with any 2 bit combination of spaces, 1's or 0's.

Readout does not destroy the data in the memory, and the data may be read out more than once. After the 64th word has been transmitted, the memory returns to the task of additional data acquisition. When the 65th data point is read into the memory, it takes the place of the oldest word. This replacement of the oldest word with the most recent word continues as long as data is presented to the memory. The memory is organized like a wheel with 64 word positions on the perimeter. At any time only the last 64 data points presented to the memory will be preserved.

The advantages of this system are numerous: (1) Small, a single 4" × 6" printed circuit card, (2) Inexpensive, less than Rustrak or cassette recorders, (3) No moving parts, total electrical nature of the unit allows it to be potted for waterproofing, (4) Low power requirement, less than one milliwatt, (5) Wide power supply voltage range, 5-15 VDC, and (6) Insensitive to temperature fluctuations, -40° C to 125° C.

[6 figures, 2 tables] Reprinted in part

9.15 ANTIBIOTIC ERYTHROMYCIN TREATMENT OF FISH DISEASES

White, Fred K. (Mulwhiteson Development Co.) (pat.)
U.S. Patent 3,737,526 (June 5, 1973)
Chemical Abstracts 79, No. 9, 45832v (Sept. 3, 1973)

9.15 NITROFURANS FOR FISH

Ueno, Ryuzo, and Tetsuya Miyazaki (Ueno Pharmaceutical Applied Research Laboratory, (pat.)
Japan. 73 15,601 (May 16, 1973)
Chemical Abstracts 79, No. 9, 45839c (Sept. 3, 1973)

8.53

nonsaponifiable fraction of fat in boar carcasses. The studies indicated that C_{19}-16-ene steroids, particularly the 3-ketone, are responsible for swine sex odor.

The consumption of sheep meat is only 1.6% of the total amount of red meat eaten. The possible reason for this small amount consumed is the characteristic sheep flavor. Analysis of sheep depot fats indicated the presence of aliphatic and conjugated carbonyls. Lactones were also found in the fat.

In the poultry products studied, the carbonyls derived from fats in chicken and turkey skin were found to influence the flavors.

[2 figures, 3 tables, 47 references] SW

9.12 (1.85)(1.0117)

The salinities of the waters of the coastal bay areas are directly influenced by rainfall and river water intrusion. The amount of rainfall and river discharge during the spring, thus, directly affects the production of brown shrimp in May. Discharges from the river were considerably lower during good production years for brown shrimp than they were during poor production years. Also, for white shrimp, the best production years occurred during the lowest summer river discharges, and the poorest production years occurred during the highest summer river discharges.

[10 figures, 8 tables, 54 references] FTP

9.15 (9.16) A SURVEY OF FISH HEALTH MANAGEMENT IN IDAHO

Klontz, George W. (College of Forestry, Wildlife and Range Sciences, University of Idaho)
American Fishes and U.S. Trout News 18, No. 9, 8-9, 11-13, 16-17, 20 (Sept.-Oct. 1973)

Idaho may be the leading state of this nation in the production of hatchery-raised game and commercial fish. Because fish health and disease management constitutes an important aspect of hatchery-fish operations, a survey was made of such management practices in Idaho. This article reports the results of that survey.

Fish farming in Idaho provides fish for game-fishing (recreational) purposes and for commercial production (live fish or processed fishery products). Commercial production of trout, salmon, and catfish involves six basic components: (1) Production of eggs, (2) Rearing of fish for sale as live or processed fishery products, (3) Grow-out or farm pond operations where small fish are reared to market size, (4) Processing of fish, (5) Fee-fishing or fish-out pond operations primarily for recreational fishing, and (6) Hauling of live fish to out-of-state distribution points.

In this survey, the commercial operators reported 15 types of infectious and noninfectious diseases of fish. This article lists the diseases, describes the nature of the diseases, and offers some suggestions for control. This information, particularly, may be of practical use to managers of commercial fish growing operations.

[4 references] FTP

9.16 (1.85)(1.018) THE FEASIBILITY OF BRINE SHRIMP PRODUCTION ON CHRISTMAS ISLAND

Helfrich, Philip (Principal Investigator) and collaborators
Sea Grant Technical Report UNIHI-SEAGRANT-TR-73-02, University of Hawaii, Honolulu, Hawaii (July 1973), 173 pp.

This bulletin is a report of a study to determine the feasibility of the commercial production of brine shrimp, Artemia salina, at Christmas Island. The island is part of the Line Islands and is located 105 miles north of the equator and about 1,100 miles due south of the island of Maui in the Hawaiian Archipelago. The initial objectives of the study were: (1) to examine data from an ecological reconnaissance of Christmas Island to determine whether the lakes on the island can support a viable commercial Artemia aquaculture venture, (2) to determine from laboratory studies the requirements for the optimal production of brine shrimp under the conditions existing in the lakes on the island, and (3) to conduct product development, marketing, and economic feasibility studies on the production of Artemia as a source of protein for human use.

Brine shrimp are small crustacea about 1-2 cm long. They occur in the highly saline waters of natural salt lakes and seas, and in the brine of manmade solar salterns. In their natural habitat, the brine shrimp graze on single-cell algae at all stages of their life cycle. They have a rapid generation time, achieving sexual maturity in about 2 weeks after hatching, and they will then reproduce continuously throughout their 6-month to 1-year life span. Because the organism shows a high food conversion efficiency and level of productivity, and

9.16 (9.14) THE USE OF AN ELECTRIC CURRENT IN THE PROPHYLAXIS OF DIPLOSTOMATOSIS IN FISH

Vlasenko, M. I. (All-Union Institute of Experimental Veterinary Surgery, Moscow, U.S.S.R.)
Journal of Ichthyology 12, No. 5, 844-849 (1972)

Experiments were carried out to determine the sensitivity of the cercariae of Diplostomum spathaceum Rud. (causative agent of diplostomatosis in fish) to alternating current of commercial frequencies (50 hertz). The objective was to determine the feasibility of using an electric current to rid water entering incubators and rearing plants of fish hatcheries from the causative agent of diplostomatosis in fish. In the laboratory tests, a specially constructed electrical chamber was used in which the electrodes consisted of two opposing walls of thin (1 mm) stainless steel (10 × 10 cm). The remaining walls were of transparent plastic. Voltage, current strength, and exposure time were measured and the conductivity of the water and current density were calculated. Water temperature was 18° to 20° C. The D. spathaceum cercariae were obtained from infected mollusks. The concentration of cercariae used in the tests was 100 cercariae/ml.

The use of electric current in the control of diplostomatosis appears to be effective and practical. The laboratory tests indicated the following lethal parameters for the cercariae of D. spathaceum: field strength 100 v/cm with an exposure time of 3.5 sec; 150 v/cm for 1 sec; 200 v/cm for 0.5 sec; and 250 v/cm for 0.3 sec. Even so, the author indicates that a large proportion of the cercariae did not perish immediately, but did perish within 7-10 min. The electric current at parameters lethal to D. spathaceum cercariae did not alter the pH value

9.16 (1.37) BRACKISH WATER CAGE CULTURE OF RAINBOW TROUT (SALMO GAIRDNERI), IN SOUTH ALABAMA

Tatum, Walter M. (Alabama Dept. of Conservation and Natural Resources, Dauphin Island, AL 36528)
Transactions of the American Fisheries Society 102, No. 4, 826-828 (Oct. 1973)

In November 1971 rainbow trout were placed in a circular raceway filled with freshwater at Dauphin Island. The freshwater in the raceway was replaced with brackish water to a salinity of 20 ‰ over a 24-h period. After 3 h in brackish water the trout were fed a commercial trout chow containing 40% protein. After 6 days the trout appeared to have successfully made the transition to brackish water and were transferred to floating cages. The cages were cylindrical and constructed of vinyl-coated hardware cloth with a 1.27 cm^2 mesh. The cloth was braced by fiberglass hoops and held together with hog nose rings. Flotation was provided by blocks of styrofoam attached to the exterior of the cage. A feeding ring suspended centrally from the top of the cage dispensed the trout chow. The trout were stocked in the cages at the rate of 392/m^3 or 196/m^3 and separated into groups feeding at the rate of 5% or 3% of their body weight per day. They were fed twice daily for at least 6 days per week. The average weight of each trout at the beginning of the experiment was 93.8 g. At the end of 120 days the trout stocked at 392/m^3, and fed at 5% and 3% of their body weight, attained an average individual weight of 322.3 g and 316.7 g, respectively. Trout stocked at 196/m^3 attained weights of 354.1 g and 354.8 g, respectively. There was no significant difference in the weight gain produced by the feeding rates, but there was a significant difference in the gain between high and low stocking density. The study

9.16 (9.14)

or the content of dissolved oxygen and active chlorine; also the temperature of the water varied within the limits that are not important to the fish at conductivities of up to 4.0×10^{-4} $ohm^{-1} \cdot cm^{-1}$. The trials with young trout held in water (containing D. spathaceum cercariae and exposed to electrical treatment) indicated that the electrical current was harmless to the developing fish and that sublethal current parameters could be employed with highly efficient prophylactic effect.
[5 tables, 4 references] FTP

9.16 (1.37)

shows that trout can be adapted easily to brackish water; further, the results indicate significant weight gains in the trout during the winter in southern Alabama.
[2 figures, 2 tables, 7 references] SW

9.16 AN IMPROVED CAGE DESIGN FOR USE IN CULTURING CHANNEL CATFISH

Kelley, John R., Jr. (Dept. of Wildlife and Fisheries Sciences, Texas A. & M. University, Agricultural Experiment Station, College Station, TX 77843)
Progressive Fish-Culturist 35, No. 3, 167-169 (July 1973)

A cage for use in culturing catfish was designed that (1) is strong enough to be lifted clear of water while containing 1,000 lb of fish, (2) has an expected useful life of 5 years or more, (3) costs no more than $50, and (4) is resistant to fouling and corrosion. The method of construction of the cage is described and three figures showing design of the cage are given.
[5 figures, 1 reference] FTP

9.16 (9.6) TEXTBOOK OF FISH CULTURE: BREEDING AND CULTIVATION OF FISH

Huet, Marcel (In collaboration with J. A. Timmermans)
Translated from the 4th French edition of "Traité de Pisciculture," published by Editions Ch. De Wyngaert, Brussels (1970). Available from Fishing News (Books) Ltd., West Byfleet, Surrey, England. 436 pp. Price £12.50 (About US$30.00).
H. S. Swingle (reviewer) (Dept. of Fisheries and Allied Aquacultures, Auburn University, Agricultural Experiment Station, Auburn, AL 36830)
Transactions of the American Fisheries Society 102, No. 4, 852-853 (Oct. 1973)

This book is an excellent summary of world fish culture and it is especially well illustrated with pictures of fish culture throughout the world. It deals with ponds and fish suitable for culture, techniques of fish culture, control and increase of fish production, and fish harvesting. FTP

9.16 [FISH FARMING ON THE FRENCH MEDITERRANEAN COAST. CURRENT TRENDS AND PERSPECTIVES] LES CULTURES MARINES SUR LE LITTORAL FRANCAIS DE LA MEDITERRANÉE. ACTUALITÉ, PERSPECTIVES

Raimbault, R., and H. Tournier (Stn. Exp. Rech., Conchylic., I.S.T.P.M., 6 rue Voltaire, 34 Sete, France)
Sci Pêche, Bull. Inst. Sci. Tech. Pêches Marit., No. 223, 1-18 (1973) (In French)
Aquatic Sciences & Fisheries Abstracts 3, No. 9, 150, Abstract No. 3Q9889M (Sept. 1973)

Shellfish farming was practiced at two places, Lake Thau and Toulon, before 1960. In that period, 6-8,000 tons of mussels and oysters were produced annually from an area of 236 ha in Lake Thau; about 100 tons of shellfish were produced annually from a small area in Toulon. Since 1960 the fish farming operations at these locations have been extended, and fish farming has been established at other locations. At Lake Thau 10,000 tons of shellfish were produced on an area of 352 ha in 1971 with a value of 24 million francs. Production at Toulon had increased to 270 tons for 1971. At a new location, Salses-Leucate, 1,000 tons of Portuguese oysters, valued at 4 million francs, were produced on 32 ha. Two new locations have been established in Corsica on Lakes Diane and Urbino. Mussels and oysters are the main products, using the suspension method for cultivation. The article contains detailed information on the methods of cultivation and a discussion on the future of the industry. Experiments on fish farming have resulted in selection of gilt head bream, bass, and eels as species for cultivation rather than shrimps and lobsters. SW

9.16 (1.85)(1.018)

is able to withstand environmental stress, it appears suitable for large-scale aquaculture in the tropical environment.

The suitability of a selected lake on Christmas Island for Artemia culture was studied. This work consisted of: (1) a broad survey of the lakes on the island to determine in situ plant nutrient levels, (2) the response of selected lakes to various nutrient treatments, and (3) Artemia egg-hatching experiments in the water of certain lakes selected for their apparent suitability. The distribution of plant nutrients in Christmas Island lakes was quite variable. Good Artemia egg-hatching was obtained in water from some of the lakes tested. In the laboratory tests under optimal conditions, the Artemia reached sexual maturity in 7 to 10 days.

The authors present a proposed scheme for a brine shrimp production, harvesting, and processing system. They recommend, however, that a pilot operation be started first so that sufficient data and experience can be gained upon which to base more firm decisions on a commercial-scale operation.
[33 figures, 57 illustrations, 35 tables, 97 references] FTP

9.16 SHELLFISH MARICULTURE IN AN ARTIFICIAL UPWELLING SYSTEM

Baab, Judith S., Gerald L. Hamm, Kenneth C. Haines, Arthur Chu, and Oswald A. Roels (Lamont-Doherty Geological Observatory, Columbia University and City University Institute of Oceanography New York, New York and Palisades, N.Y.)
Proceedings of the National Shellfisheries Association 63, 63-67 (June 1973)

Deep ocean water is cold and is rich in minerals and other nutrients necessary for plant life. This accumulation of nutrients in the deepwater layers comes from the photosynthesis that occurs in the euphotic zone (the zone limited to a depth of about 100 m). In this zone the unicellular plankton convert solar energy, CO_2, water, nitrate, phosphate, and other trace mineral elements into protoplasm for their cells (the first link in the food chain). As a result of this process, CO_2, nitrogen, and phosphorus are extracted from solution in the upper layer of the sea. The particulate organic matter from the dead and disintegrating phytoplankton and the excreta from the zooplankton sink through the water column. Bacterial and chemical action convert this organic material to inorganic nitrate, phosphate, etc., resulting in the high content of dissolved nutrients in the deep water.

A mariculture system has been set up on the north shore of St. Croix, U.S. Virgin Islands, in which sea water from 870-m depth is pumped into 45,000-liter concrete onshore pools where planktonic algae are grown as food for shellfish. The diatoms, Bellerochea sp., Chaetoceros simplex, and Thalassiosira pseudonana are grown to feed shellfish. At the St. Croix site, the depth of the ocean is 1,000 m about 1.6 km offshore.

9.16 (6.31) EXPERIMENTAL STUDIES ON THE MARINE ALGAE IRIDAEA AND GIGARTINA

Waaland, J. Robert (Dept. of Botany, University of Washington, Seattle, WA 98105)
Journal of Experimental Marine Biology & Ecology 11, 71-80 (1973)

Laboratory and field studies were carried out on the growth of the marine algae I. cordata and G. exasperata. These algae are sources of the industrial phycocolloid carrageenan. The studies were carried out to obtain information essential to the aquaculture of the species. The purpose of the laboratory tests was to determine the optimum temperature and light intensity for rapid growth in laboratory culture. The purpose of the field tests was to determine growth rates and the optimum depth for rapid growth. The algae used were obtained subtidally in Snug Harbor, Mitchell Bay, San Juan Island, Wash. The field transplant tests were carried out in the San Juan Archipelago and at various other sites where neither of the test algae occurred naturally. Growth measurements were made at monthly intervals, and a photographic record was made of each plant. A simple and successful method, described in this report, was developed for experimental transplantation that permitted periodic removal, measurement, and photography of the transplanted algae. The field tests also demonstrated that the method was successful in transplanting algae to habitats in which they do not naturally occur.

The growth rates of transplanted I. cordata and G. exasperata and the maximum size they attained were comparable to those of the species in the population from which the transplanted algae were taken. The optimum depth for the maximum rate

9.19 [ACCUMULATION OF CHLORINATED HYDROCARBONS IN FISH]
ZUR SPEICHERUNG VON CHLORIERTEN KOHLENWASSERSTOFFEN IM FISCH

Huschenbeth, E.
Archiv für Fischereiwissenschaft 24, Nos. 1-3, 105-116 (Aug. 1973) (In German, English summary)

Analyses were performed to determine the level of accumulations of the pesticides DDT and its anaologs, lindane, and dieldrin in 2,250 marine and freshwater fishes. The results of the analyses indicate that most of the lean fish of the North Atlantic Ocean, the North Sea, and the Baltic Sea had DDT levels of less than 0.1 p/m. Higher values were found in fat fish, but most levels were below 1.0 p/m. The levels of PCB were 0.2 p/m in lean fish and up to 1.3 p/m in fat fish. Freshwater fish in the rivers Moselle, Elbe, Aller, and Trave contained high concentrations of DDT. Some values were up to 6 p/m; however, most of the fish had accumulated less than 1.0 p/m. The concentration of PCB in freshwater fish was slightly higher than in marine fish. Liver of cod from the central Baltic Sea contained up to 57 p/m DDT and its analogs; average values of 30 p/m were found.
[11 tables, 7 references] SW

9.17 AN EXAMINATION OF LEGISLATION FOR THE PROTECTION OF THE WETLANDS OF THE ATLANTIC AND GULF COAST STATES

Haueisen, Anthony J. (School of Law, University of Mississippi, Oxford, Miss.)
Gulf Research Reports 4, No. 2, 233-263 (Nov. 1973). (Published by Gulf Coast Research Laboratory, Ocean Springs, Miss.)

Wetlands is a term that describes the water-land interface. Wetlands are also known as salt marshes, tidal marshes, marshlands, tidelands, submerged lands, swamps, sloughs, bogs, mud flats, wet meadows, and flood plains. People use these terms interchangeably, but ecologists differentiate between many of them. The Maryland State Planning Dept. classified wetlands in two major categories: inland, freshwater wetlands, and coastal wetlands with two subdivisions, fresh and saline areas [Draft Report-Wetlands In Maryland, p. V3 (Jan. 1970)].

In a short section on basic wetlands ecology the author suggests that tidal marshes and estuaries are among the most fertile and productive areas in the world. Since they are so important, laws of the Federal Government and the States, enacted to protect the wetlands, are examined.

The jurisdiction of the Federal Government over wetlands is traced back to the English Common Law and control of these lands by the Crown. The states of the Atlantic and gulf coasts have absolute title to submerged lands subject to paramount right of control by the Federal Government under the Commerce and Navigation clauses of the constitution. A series of laws have been enacted by Congress relating to jurisdiction of the Federal Government to the 3-mile limit,

9.16 (6.31)

of growth of the plants (field experiments) was 3-5 m below M.L.L.W. (mean low low water). The optimum growth rates (laboratory experiments) were at 10°-14° C and light intensities of 8.9×10^3-16.0×10^3 erg/cm^2 (cool-white fluorescent); the author indicates that these light intensities are much higher than the optimum for many of the red algae grown in laboratory culture. The author believes that it is feasible to biologically culture I. cordata and G. exasperata in the inland waters of the Pacific Northwest.
[10 figures, 13 references]
FTP

9.16 FISH FARMING INTERNATIONAL, NO. 1, 1973
(9.6)
Anonymous
Published by Fishing News, London (1973), 152 pp. £3.00.
I. D. Richardson (reviewer)
Journal of Fish Biology 3, No. 6, 801 (Nov. 1973)

A new journal has been launched with the publication of No. 1 of Fish Farming International. The contents are expected to include articles describing the research programs and results of various laboratories. In addition, there will be articles on the construction and operation of fish and shellfish farms. Investment, costs, and profitability will be the subject of other articles on fish farming.
SW

9.16

In the initial tests, juvenile oysters (Crassostrea virginica) and clams (Mercenaria mercenaria) were placed in the system. The oysters grew well during the first few months, but died rapidly thereafter. It appeared that survival and growth of the clams were good; however, they ceased feeding for 24-48 h after they were handled. Additional studies on the comparative growth rates of C. virginica, C. gigas, and Ostrea edulis are underway.
[6 figures, 2 tables, 3 references]
FTP

9.16 [TECHNICAL NOTE ON THE DISINFECTION OF 'EYE STAGE' EGGS OF TROUT] FICHE TECHNIQUE CONCERNANT LA DÉSINFECTION DES OEUFS EMBRYONNÉS DE TRUITE

Gérard, J. P. (Lab. Ichtyopathol., INRA, 78850 Thiverval-Grignon, France)
Piscic. Fr. 32, 36 (1972) (In French)
Aquatic Sciences & Fisheries Abstracts 3, No. 9, 139, Abstract No. 3Q9834F
(Sept. 1973)

Fish eggs purchased for rearing may be carriers of diseases and parasites. The eggs should be disinfected before they are introduced into the fish pond that is free of pathogenic or parasitic organisms. Two products bearing the general trade name of 'Iodophores' were tested by the author. When each egg contains an embryo with distinct dark eyes it should be sprayed individually for 15 to 30 min with the water in which it is to be incubated. The eggs are then exposed to a solution of an iodophore at the 50 p/m level for 10 min. This treatment is followed by three rinses to remove all traces of the iodophore solution.
SW

9.17

regulatory powers of the Coast Guard and other Government Agencies, water pollution, oil pollution, migratory waterfowl, and restoration of water quality.

Short summaries of state legislation regulating the use of the wetlands are given for: Maine, New Hampshire, Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Delaware, Maryland, Virginia, North Carolina, South Carolina, Georgia, Florida, Alabama, Mississippi, Louisiana, and Texas. The general legal approach of these laws enables a state to acquire wetlands; prohibits certain activities in wetlands; regulates conditions for performing work, such as dredging; provides funds in arrangements with counties for maintenance of wetlands; and prevents encroaching on flood plains. The author calls special attention to laws in the following states: Connecticut--wetlands acquisition; Florida--sale of tidal lands; Maine, Massachusetts, and New Hampshire--regulation of dredging and filling; New York--cooperative management agreements; and Rhode Island--wetlands zoning and regulation of dredging and filling.

The author has provided a copy of a model bill for presentation to the legislature of any state for the purpose of protecting the wetlands. It provides for preservation and development of coastal wetlands, procedures for obtaining permits to alter wetlands, and penalties for violation of the act.
SW

9.17 COASTAL ZONE MANAGEMENT: MULTIPLE USE WITH CONSERVATION
(9.6)
Brahtz, J. F. Peel (editor)
John Wiley and Sons, Inc., New York (1972), xii + 352 pp. $19.50.
Wynnlee Crisp (reviewer)
Transactions of the American Fisheries Society 102, No. 4, 855-856 (Oct. 1973)

This book is a compilation of 11 papers on the subject of regional management of the coastal zone. The article by William A. Nierenberg deals with the constraints of increasing nationalization and the Conventions of Geneva (Law of the Sea 1958) on oceanographic exploration. The conflicts in the uses of the coastal zone such as human recreation, wildlife habitat, seafood source, and waste disposal are discussed in the article by Milner B. Schaefer. The subjects of other articles in the book include traffic and transportation in relation to congestion and pollution, mineral resources and controls developed by the California control authority, systems planning and control, research and development, ocean installation and disposal systems, and the status of marine transport technology.
SW

9.16 SYSTEM FOR GROWING CONCENTRATED POPULATIONS OF OYSTERS AND RELATED SHELLFISH

Wiegardt, John L., Jr. (Nahcotta, Wash.) (pat.)
U.S. Patent 3,766,888 (Oct. 23, 1973)

This patent concerns the aquaculture of molluskş, such as free oyster and clam seed, either in rafts anchored in tidal flow areas or in a flume system. FTP

9.19 (0.8)(9.2) ELECTRIC POWER PLANTS IN THE COASTAL ZONE: ENVIRONMENTAL ISSUES

Clark, John (Conservation Foundation, Washington, D.C.), and Willard N. Brownell
Special Publication No. 7, American Littoral Society, Highlands, NJ 07732 (Oct. 1973), viii + 146 pp. Price $5.00.

An extensive study was made of the environmental issues involved in electric power development in the coastal zone of the United States. The authors were charged to make an objective review of current scientific knowledge on environmental impacts of power plants and to provide scientific opinion as to whether any delays in electric power development (caused by a consideration of environmental impacts) were justified by their potential for environmental damage. This study dealt primarily with environmental impacts associated with steam plants. The authors indicate that their findings are presented in such a way as to be most useful to those who have to make policy decisions relative to power development in coastal areas.

The authors conclude that electric power production can harmonize with environmental protection if certain practices are followed relative to the location and design of the power plants. Furthermore, thermal pollution is not the leading adverse environmental threat from power plants (as commonly believed). The greater environmental hazard is the high death rate of the small aquatic organisms suspended in the water and which are drawn into the plants with the huge volumes of cooling water (withdrawn from public waters for the old-fashioned, open-cycle, or once-through, cooling of steam condensors). The death rate of

9.19 THE STATE OF MARINE POLLUTION IN THE MEDITERRANEAN AND LEGISLATIVE CONTROLS

Anonymous
Food and Agriculture Organization of the United Nations, Studies and Reviews, No. 51, 68 pp. (Sept. 1972) (FAO, Via delle Terme di Carcalla, Rome, Italy)

The Mediterranean Sea is divided into the eastern and western basins by the Sicilian Ridge: each basin has hydrographic conditions which must be considered relative to pollution problems.

The rate of evaporation of the Mediterranean exceeds the amount of precipitation combined with the inflow from the rivers Rhone and Po; the inflow from the Nile is negligible. The salinity is one of the highest. The main source of replenishment is a strong inflow from Atlantic surface water through the Strait of Gibraltar. This steady current can be observed as far east as the vicinity of Turkey. There is a strong undercurrent during February and March, based on thermocline convection that passes out through Gibraltar at a depth of 275 m. and a velocity equal to the current entering near the surface.

Throughout the basin domestic waste water is being discharged by the main urban centers. There are a few purification plants, but they are insufficient in capacity. The most severe conditions are in the northwestern section (Catalonia, Gulf of Lyons, Provence, and Gulf of Genoa), the North Adriatic, and along the Lebanon and Israel coasts. No reports were provided for the study by Syria, Libya, or Algeria. Information about conditions along the African coast is therefore scarce.

9.19 (1.23)(6.1) MERCURY CONCENTRATIONS IN FISH, PLANKTON AND WATER FROM THREE WESTERN ATLANTIC ESTUARIES

Cocoros, Glenn, Phyllis H. Cahn (Dept. of Marine Science, Long Island University, Greenvale, NY 11548), and William Siler
Journal of Fish Biology 5, No. 6, 641-647 (Nov. 1973)

The Atlantic menhaden inhabits the inshore waters of the western Atlantic Ocean from Florida to Massachusetts. The menhaden feed on plankton. The authors declare that there is no agreement in the literature on the relationship between the mercury levels in fish and their food habits and whether there is any food chain intensification of mercury. An investigation was carried out to determine the mercury levels in the menhaden and in the plankton on which they feed.

Samples of menhaden of year-class 1 and 2 were collected in three locations: Core Sound, N.C., Chesapeake Bay, Md., and Oyster Bay, N.Y. Fish tissues were homogenized and digested by the procedure of J. F. Uthe, A. J. Armstrong, and M. P. Stainton [J. Fish. Res. Bd. Can. 27, 805 (1970)] to determine mercury content. Concentration of mercury in plankton samples collected from the same locations were also determined. In addition, mercury determinations on samples of 4-year-old menhaden were also performed.

The results indicate that no high mercury levels were found in the menhaden taken from all three locations. The mean mercury levels of the viscera ranged between 0.06 and 0.12 p/m, wet weight. No evidence of high food chain intensification was found. Higher mercury concentrations were found in phytoplankton than zooplankton, and menhaden mercury levels were about twice those in the plankton,

9.19 (8.42) MERCURY CONTENT OF OREGON GROUNDFISH

Childs, E. A., and J. N. Gaffke (Seafoods Laboratory, Dept. of Food Science and Technology, Oregon State University, Astoria, OR 97103)
Fishery Bulletin 71, No. 3, 713-717 (July 1973)

The mercury content of Oregon groundfish was determined. The mercury content of rex sole, Glyptocephalus zachirus; Dover sole, Microstomus pacificus; petrale sole, Eopsetta jordani; English sole, Parophrys vetulus; sand sole, Psettichthys melanostictus; starry flounder, Platichthys stellatus; canary rockfish, Sebastes pinniger; flag rockfish, Sebastes rubrivinctus; yellowtail rockfish, Sebastes flavidus; rougheye rockfish, Sebastes aleutianus; sablefish, Anoplopoma fimbria; lingcod, Ophiodon elongattus; Pacific hake, Merluccius productus; and arrowtooth flounder, Atherestes stomias, was significantly lower than 0.50 ppm mercury. All spiny dogfish, Squalus acanthias, samples contained >0.50 ppm. No highly significant relationship in those species appropriately examined between (a) catch locations, (b) time of catch, (c) weight and length of fish, or (d) sex and mercury content was observed.
[2 figures, 3 tables, 7 references] Authors' abstract

9.19 (1.23)(6.1)

0.1-0.2 p/m dry weight, (phytoplankton and zooplankton). Other findings indicate a slow mercury cumulation by the menhaden, since 4-year-old fish showed twice the mercury levels found in juveniles. In addition, mercury cumulation appeared to occur in the digestive system rather than through the external epithelium, and higher levels were found in the viscera than in the other parts of the fish. The authors suggest that evisceration prior to processing may, if necessary, reduce mercury levels in fish meal made from menhaden.
[5 tables, 18 references] SW

9.19 (1.36) ACUTE TOXICITY OF POLYOXYETHYLENE ESTERS AND POLYOXYETHYLENE ETHERS TO S. SALAR AND G. OCEANICUS

Wildish, D. J.
J. Water. Res. 6, 759-762 (1972)
Water Pollution Abstracts 46, No. 1, 30, Abstract No. 172 (Jan. 1973)

The toxicity of nonionic surface-active agents, of the type used in oil-dispersing formulations, was investigated using salmon part in fresh water and Gammarus oceanicus, a crustacean, in seawater. The polyoxyethylene ethers were much more toxic than the polyoxyethylene esters to both organisms. The lower toxicity of the esters was attributed to the relative ease of cleavage of the ester linkage by lipid metabolizing enzymes. SW

9.19 (0.8)(9.2)

sensitive forms of aquatic biota that pass through powerplant open-cycle systems could approach 100%. A single power station located in a vital aquatic area (estuary) could kill 30 to 50% of the populations of such valuable fishes as striped bass by withdrawing them with cooling water from their breeding areas. However, this potential problem can be solved by (1) locating power plants along the open coast where there is deep water nearby for strategic placement of intake and outlet structures and (2) reducing the volume of cooling water by requiring power plants to use closed-cycle systems which recirculate cooling waters. Additional conclusions and recommendations are presented. Chapters are included on estuarine ecology, powerplant design, vulnerability of estuarine biota, and Federal regulations, and a complete listing of all major coastal power plants in the United States with a tabular description of each. FTP

9.19 TREATMENT OF THE WASTE WATER FROM THE FISHERIES INDUSTRY. I. PURIFICATION BY FLOCCULATION

Oshima, Hitoshi, Kazuo Toriyabe, Yoshiharu Nagata, Masanori Sasaki, Satoru Aizawa, and Kikuo Ikawa (Hokkaido-Ritsu Kushiro Suisan Shikenjo, Kushiro, Japan)
Chemical Abstracts 79, No. 16, 96591y (Oct. 22, 1973)

9.19 (9.8) LOW pH VALUES SHOWN TO AFFECT DEVELOPING FISH EGGS (BRACHYDANIO RERIO HAM.-BUCH.)

Johansson, N., J. E. Kihlström, and A. Wahlberg (Institute of Zoophysiology, Box 560, S-751 22 Uppsala 1, Sweden)
AMBIO 11, No. 1-2, 42-43 (1973) (AMBIO, Box 45, 143 S-104 30, Stockholm 45, Sweden)

The lakes and rivers of northwestern Europe are becoming more acid due to emission of sulfur compounds into the atmosphere from fossil fuels and from industrial processes. pH values as low as 4 have been found in certain lakes in Sweden; striking changes in the fish populations of these lakes also occurred. Quite possibly the development of the fish eggs may be disturbed by the low pH of their aquatic environments. This paper reports on a study of the variability and the frequency of hatching of fish eggs reared in water with different pH values. Zebra fish were used in the tests. Acetate-borate-phosphate buffer solutions at pH 4.0, 5.5, 7.0, 8.5, and 10.0 (with a calculated final molarity of 6.0) were used for the fish egg hatching tests. The frequency of hatching of the zebra fish eggs decreased from about 50% at pH 7 to about 4% at pH 4; the young embryos were the most sensitive to acid water. The period from fertilization to hatching tended to become prolonged at low pH values. At slightly alkaline solutions, the frequency of hatching of the eggs remained unchanged, but there was a slight shortening of the period from fertilization to hatching. Assuming that these results on zebra fish also apply to other species of fish, the increasing acidity of the lakes in northwestern Europe may pose a serious problem relative to their fish populations.
[4 figures, 11 references] FTP

9.19

In spite of pollution from large concentrations of industry along areas of the western Mediterranean, the levels of organic load and toxic substances are not yet dangerous. However, in parts of the Aegian Sea, the Levant Basin (Turkey), and the Sea of Marmara (Turkey) effluents from industry are adversely affecting aquatic life.

Oil is one of the most widespread contaminants of the ocean. The eastern basin is mainly a region of oil production and there are few major contributors of oil pollution. In comparison, there are many oil processing enterprises in the western basin with heavy transhipment of oil products that are major sources of oil pollution. Future exploitation of petroleum deposits on the coasts of Spain is expected to aggravate conditions. Discharges from tanker ballast are estimated to contribute 300,000 tons of oil annually.

Information on levels of pesticides is scarce. It can be assumed that coastal waters are receiving pesticide residues of countries with high agriculture production. In the western Mediterranean, particularly in estuaries and sheltered areas, pesticide concentrations are at levels that adversely affect marine organisms.

A review of pollution laws of the countries adjoining each other on the coast leads to the conclusion that they are ineffective. A comparison of the regulations relative to pollution indicated that the laws should be unified. Unified regulations would be advisable because each country belongs to the same environmental unit. Action on laws would require that pollution be dealt with at the source, that is, at the municipality and factory level.
[32 references, 2 maps] SW

9.19 MIREX INCORPORATION IN THE ENVIRONMENT: UPTAKE IN AQUATIC ORGANISMS AND EFFECTS ON THE RATES OF PHOTOSYNTHESIS AND RESPIRATION

De La Cruz, A. A., and S. M. Naqvi (Dept. of Zoology, Mississippi State University, Mississippi State, MS 39762)
Archives of Environmental Contamination and Toxicology 1, No. 3, 255-263 (Oct. 1973)

Mirex is a polycyclic chlorocarbon toxic agent used to control the fire ant in the southeastern states of the United States. Mirex is part of the formulation of the corncob grit bait which is aerially sprayed on areas infested with the fire ant. The toxic agent leaches out of the bait on the ground into standing bodies of water or streams which transport it further. The solubility of mirex in water is not in excess of 1 ppb, and the residue level of about 0.0001 ppb in natural waters (from a previous report) does not have any impact in the ecosystem.

To determine the rate of mirex uptake, experiments were performed on healthy specimens of leeches, a shrimp, a crayfish, an amphipod (a crablike crustacean), and a juvenile form (naiad) of a dragonfly. The animals were exposed to various concentrations of mirex ranging between 0.001 and 2.0 p/m in water, and they were held in solutions for various lengths of time (24 to 672 h). In leeches, shrimp, and crayfish held in a mirex level of 2 p/m for 48 h, the following residues (p/m) were found: 1.92, 4.91, and 5.07 in three leeches, 9.95 in shrimp, and 11.01 in crayfish. In the dragonfly naiad exposed to 0.5 and 1.0 p/m mirex

9.19 MERCURY IN TUNAS: A REVIEW
(8.42)(0.7)

Peterson, C. L., W. L. Klawe, and G. D. Sharp (Inter-American Tropical Tuna Commission, Scripps Institution of Oceanography, La Jolla, CA 92037)
Fishery Bulletin 71, No. 3, 603-613 (July 1973)

Mercury in the aquatic environment comes from both natural processes and industrial activities. The latter probably have not significantly altered the mercury content of the high seas where most tunas are captured.

Mercury compounds enter aquatic organisms through the food web and/or by direct extraction from solution. The relative importance of these pathways in tunas is unknown. Mercury occurs in tuna principally in the form of methylmercury.

Generally, tunas appear to have higher mercury levels than those fish species which occupy a lower level in the food chain.

Mercury content of tunas varies according to fish size. However, other factors such as area of capture, differential growth rates, varying analytical techniques, and different sampling methods may account for some of the observed variation.

The U.S. Food and Drug Administration has established an "in-house" standard of 0.5 ppm of mercury for fishery products sold in the United States. Other countries have established limits as high as 1.0 ppm.
[1 figure, 2 tables, 38 references] Authors' abstract

9.19 METHYLMERCURY CONTENT OF SELECTED HUMAN TISSUES
(2.9) OVER THE PAST 60 YEARS

Kevorkian, Jack, Donald P. Cento, John F. Uthe, and Richard A. Hagstrom
American Journal of Public Health 63, No. 11, 925-1018 (Nov. 1973)

Twenty fixed human autopsy tissue samples (brain, liver, kidney) from both sexes and different age groups, and from as far back as the year 1913, were analyzed for total mercury content and for methylmercury content. Also, eight fresh frozen samples (the same tissues and muscle) from two recent (1972) autopsies were similarly analyzed. The total mercury levels showed a marked decrease since the early part of the century and a fairly constant level over the past several decades. Methylmercury levels in the same tissues were either infinitesimally small or totally undectable. In view of recent proclaimed dire threats of ecological "pollution" with mercury, the authors suggest that these results underscore the urgent need for sound, more pertinent research before any reasonably unjustifiable social or political action is taken.
[1 table, 13 references] FTP

9.2 COMPARISON OF THE ECONOMIC POTENTIAL OF AQUACULTURE,
(9.16) LAND ANIMAL HUSBANDRY AND OCEAN FISHERIES:
THE CASE OF TAIWAN

Shang, Yung C. (Economic Research Center, University of Hawaii, Honolulu, Hawaii)
Aquaculture 2, No. 2, 187-195 (June 1973)

This article is a discussion of the economic potential of aquaculture with respect to comparative costs of production between cultured fish and land animal meats, rates of return on investment between the two kinds of food production, and the demand for cultured fish. Since aquaculture, ocean fishing, and hog raising are very progressive industries on Taiwan, a unique opportunity of obtaining the cost data on these activities in one country is available.

There are three types of aquaculture in Taiwan: brackish water culture, of milkfish mainly; freshwater culture of carp and tilapia; and shallow sea culture mainly of oysters. In the table that follows comparisons of productivity, nutrition, and cost are made between aquaculture production, hog production, and ocean fisheries.

9.19 ACCUMULATION AND MOVEMENT OF MIREX IN SELECTED ESTUARIES OF SOUTH CAROLINA, 1969-71

Borthwick, P. W. (Gulf Breeze Environmental Research Laboratory, U.S. Environmental Protection Agency, Gulf Breeze, FL 32561), T. W. Duke, A. J. Wilson, Jr., J. I. Lowe, J. M. Patrick, Jr., and J. C. Oberheu
Pesticides Monitoring Journal 7, No. 1, 6-26 (June 1973)

The chlorinated hydrocarbon mirex is the insecticide component of a bait used to help control the fire ant. The chemical was previously considered to be nontoxic to nontarget organisms, but recent laboratory tests showed that it is toxic to decapod crustaceans, including juvenile crabs and penaeid shrimp. The purpose of the present work was (1) to determine the possible movement of mirex from treated areas near Charleston, S.C. to the estuarine environment and (2) to determine the levels of mirex in certain marine organisms. The various areas were treated with Mirex 4X Bait by aircraft or by hand spreaders. The bait contained 84.7% corncob grits, 15.0% soybean oil, and 0.3% mirex. The bait was applied at 1.25 lb per acre (or 1.7 g of technical mirex); this rate of application amounted to about 16 particles of bait per square foot. Samples for analysis were taken before and after the application of mirex. The samples included water, bottom sediments, shrimp, crabs, fish, and estuary-dependent birds. Analysis for mirex was by electron-capture gas chromatography.

The mirex apparently was translocated from treated lands and high marsh to estuarine biota--all the animal classes sampled contained mirex. The residues of mirex in the sample categories were: water, <0.01 ppb; sediment, 0.-07 p/m; crabs, 0-0.60 p/m; fishes, 0-0.82 p/m; shrimps, 0-1.3 p/m; mammals, 0-4.4 p/m; and birds, 0-17.0 p/m.
[1 figure, 14 tables, 9 references] FTP

9.2 (9.16) Comparative costs of productivity and protein

Type	kg/man-year (productivity)	Cost/kg* produced	kg protein per man-year	Cost/kg* protein
Brackish water culture	5,098	0.37	519	3.63
Freshwater culture	10,453	0.31	1,148	2.80
Shallow sea culture	45,575	0.16	4,552	1.60
Hog raising	12,000	0.43	757	6.81
Ocean inshore fishery	--	0.17	--	--
Ocean coastal fishery	--	0.15	--	--

* U.S. dollars.

The cost of ocean fisheries production is lower than for aquaculture production. However, the profit margin of aquaculture operations is higher because of higher prices commanded by better product quality and consumer preference. Furthermore, aquaculture production is expected to receive the benefits of advanced technology which will further reduce costs. In contrast, the ocean fishery stocks are expected to be overfished thus increasing the cost of production. The catches of the coastal fisheries of Taiwan are already declining because of overfishing and pollution. Aquaculture occupies an important position in the food production economy of Taiwan. The author suggests that the information available in Taiwan on aquaculture may be beneficial to other developing nations with similar ecologies and economies in providing increased sources of protein.
[6 tables, 9 references] SW

9.19

levels for 24 h, the residues were 10.37 and 13.68 p/m, respectively. At 1.0 p/m for 168 h, the residue in this animal was found to be 92.90 p/m. In the amphipod held in a 0.001 p/m mirex solution for 672 h, the residue found was 2.53 p/m.

To determine the effects of mirex on plankton respiration, pure cultures of Chlamydomonas (green algae) species were exposed to water containing 1 p/m mirex. After 5, 10, 15, and 20 days of exposure photosynthesis was inhibited 16, 10, 33, and 19%, respectively.

To determine the effects of mirex on the oxygen consumption of animals, the common pond snail, the mosquitofish, and the green sunfish were exposed to water containing the leachate from toxic fire ant baits. Oxygen consumption of the snail increased 67% maximum when exposed to mirex levels of 0.008-0.07 p/m for 3 days; at a level of 1 p/m, oxygen consumption dropped 44%. The mosquitofish and green sunfish exhibited substantially decreased oxygen consumption in the fifth and seventh week, respectively, of exposure to 1 p.m mirex. The authors suggest that the reduced oxygen consumption in the organisms is due to inhibition of the aerobic respiratory enzyme system by the organochlorine compound.
[3 figures, 2 tables, 10 references] SW

9.19 INDUSTRIAL WASTES. MEAT-, FISH-, AND POULTRY-PROCESSING WASTES

Litchfield, J. H. (Battelle Mem. Inst., Columbus, Ohio) Chemical Abstracts 79, No. 14, 83096e (Oct. 8, 1973)

9.2 (0.9) MEASUREMENT OF THE CUMULATIVE EFFECTS OF TECHNOLOGY ON MACROECONOMIC GROWTH

Wedding, Donald K., and Harvey A. Maertin (University of Toledo, Toledo, Ohio)
Journal of the Patent Office Society 55, No. 8, 525-538 (Aug. 1973)

This paper reports on an examination of the cumulative effects of patents on macroeconomics. As a general hypothesis, it was proposed in this study that the macroeconomic growth of the United States, in terms of the GNP (Gross National Product), since World War II is the result of the cumulative gross national technology as measured by patent data cumulated over a given period of consecutive years. In this study, the GNP was measured as a function of cumulative patent applications or issued patents over a series of varied time periods ranging from 1 to 17 years, a separate cumulation of patent applications or issued paterts being compiled for 1 year, 2 years, and so on through 17 years. Then, using regression analysis, each cumulation of patent data was statistically correlated with the GNP over the time span of 1945 through 1966. The results of this study indicated that a U.S. patent has an effective economic statistical life of about 6 years, and that there is a statistically significant correlation between cumulated issued patents, or patent applications, and GNP data.
[9 tables, 15 footnotes] FTP

9.2 ENERGY SUBSIDY AS A CRITERION IN FOOD POLICY PLANNING

Slesser, Malcolm (Program on Policies for Science and Technology in Developing Countries, Cornell University, Ithaca, NY 14850)
Journal of the Science of Food and Agriculture 24, No. 10, 1193-1207 (Oct. 1973)

The long-term view of global food requirements, published by the United Nations [Strategy To Avert the Protein Crisis in Developing Nations, U.N., New York, 1 (1971)], is that new and unconventional sources of protein will be needed. These sources include algae production, fish protein concentrate, yeast culture, synthetic amino acids, and industrially produced nutritionally balanced foods described by A. T. McPherson [Chem. Engng. Prog. 65, No. 10, 36 (1969) and 66, No. 10, 120 (1970)], simulated animal proteins described by G. C. Mustakas, and E. L. Griffin [Adv. Chem. Ser. No. 57, Amer. Chem. Soc. 101-108], and many forms of intensive farming. In distinguishing the desirability of one of these sources of protein over another, the current criterion is economic expressed in terms of money. The value of the protein produced under this criterion is based upon shortage as perceived in the market place. Perception of shortage is a recognition of supply and demand for the present and sometime into the future; however, such an economic analysis gives insufficient information as to whether the perception of shortage is correct for the long-term view.

An alternative way to assess the ultimate value of an economic process is through thermodynamic analysis suggested by S. Berry [Congressional Record 92d U.S. Congress, S.2430 (Feb. 23, 1972)]. The various methods of protein production can then be assessed in terms of the energy inputs required of each and thus distinguished from each other in the same terms. [Thermodynamics relates the

9.2 THE MARKET FOR TUNA

Harman, G. W., and M. J. J. Macmillen
Tropical Products Institute, Foreign and Commonwealth Office, Overseas Development Administration, 56/62 Gray's Inn Road, London WC1X 8LU, England (Sept. 1973), 92 pp. Price £1.15 (Free to official agencies in developing countries) [In English, French, and Spanish]

The market for tuna may be divided into that for white meat obtained from the albacore species and light meat obtained mainly from the yellowfin, bluefin, bigeye and skipjack species. Due to labelling laws bonito tuna normally form a different product. Tuna is sold both fresh and canned. It is not normally eaten raw except in Japan. Small quantities of tuna are traded smoked or dried. Consumption is concentrated in seven countries: Japan, the USA, Peru, Taiwan, Italy, Spain and France. Of these countries Japan and the USA are easily the most important. A notable feature of international trade is the large number of transshipment points at which catches are landed before they are sent to their final destinations.

The total catch of tuna is rising slowly and in 1969 was 1 467 000 tons. Yellowfin and skipjack are the most important species in terms of the quantity landed but albacore is the most valuable. Any appreciable increases in future landings are likely to be of skipjack since other species are reaching the point of maximum sustainable yield. Japan takes over a third of the world catch. In recent years, however, her landings have fallen and those of some other countries notably South Korea and Taiwan, have risen. Production of canned tuna is concentrated in the USA, Japan and Italy. Total exports of raw tuna in 1969 were 219 000 tons. They were valued at £35.6 million. Japanese exports are twice the

9.2 ALTERNATE FORECASTS OF THE JOB CONTENT AND SKILL REQUIREMENTS OF THE AMERICAN ECONOMY IN 1980

Bezdek, Roger H., and Barry Getzel (Dept. of Economics, Institute of Labor and Industrial Relations, University of Illinois, Urbana-Champaign, Ill.)
Technological Forecasting and Social Change 5, No. 2, 205-214 (1973)

The authors analyze the potential job content and skill requirements of the American economy in 1980 under three alternative economic futures. The occupational manpower requirements were generated on the basis of a "Status quo," a "Social welfare," and a "Defense" economy in the future. The occupational manpower requirements were then translated into a Job Family-Skill Content classification [James G. Scoville, "The Job Content of the American Economy, 1940-1970," McGraw-Hill, New York (1969)] to determine how the alternative national priority choices might effect future requirements for specific jobs, skills, educational preparation, and vocational training.

The analysis indicates several strong trends in the future manpower and skill requirements of the American economy. By 1980, the manpower requirements at the upper skill levels will increase the most; employment requirements in the farm sector and for most of the middle level manufacturing jobs will continue to decline both relatively and absolutely. The service sector of the economy will show the greatest increase in employment requirements; the middle skill level III (The Job Family is classified into five skill levels.) will continue to contain the greatest total employment, and the manpower requirements at the lowest skill level will change very little. The authors indicate that these long-run trends are the same under all three economic futures simulated here and are not likely to be altered

9.2 RISKS TO THE AQUACULTURE ENTERPRISE
(9.16)

Webber, Harold H. (Groton Bioindustries Development Company, P.O. Box 517, Groton, MA 01450)
Aquaculture 2, No. 2, 157-172 (June 1973)

Aquaculture enterprise requires a special type of manager; in addition to his business knowledge, he must be sensitive to the vagaries of biological processes. The first major risk to an aquaculture undertaking may be the lack of highly qualified management.

In the development of a new enterprise a pilot plant phase of the operation should be conducted to reveal any destructive biological and physical variables that may arise. How the character and number of the variables affect the profitability of the venture are difficult to predict. The biological risks include: diseases and parasites of finfish and mollusks that could reduce or eliminate production; uncertainties relating to reproductive capacity of the husbanded species to produce viable juveniles; predators and competitors of the husbanded species may develop from larvae introduced into the water; and lack of information regarding the numbers of the cultured species on hand for adequate inventory of the cultured species. To reduce these risks, adequate nutrition and proper husbandry are required to reduce the incidence of disease and maintain productivity.

The physical factors may be controllable, but some are not. The most important element in aquaculture is the quality of the water environment of the cultured species. The water must be constantly monitored for pesticides, pollution from the cultured species, domestic wastes, waterborne disease organisms, chemical con-

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by a major policy of disarmament or by an increase of international tensions. The choice of national priorities, however, will have a substantial effect on total employment, and on the requirements for many types of skills, jobs, and the types of skills required within different job families. As a result accurate forecasting of educational, vocational, and skill requirements for many manpower categories may be difficult. Also, the national priorities selected in the future can have an important effect on income distribution. A concentration on certain social and economic programs intended to assist the lower income groups may have the opposite effect by indirectly shifting job requirements away from the lower skill levels and the blue collar operations.
[3 tables, 12 references]

FTP

9.19 EFFECT OF SULFUR DIOXIDE ON AQUATIC ORGANISMS

Chemical Abstracts 79, No. 19, 112176z (Nov. 12, 1973)

Wrobel, D. (Hydrobiol. Res. Inst., Pol. Acad. Sci., Ceacow, Poland)

9.2

energy (of heat) transferred to or from a system with the work done on or by the system. Abstractor's note] The author defines energy subsidy as the energy input requirement of each food production activity such as soil preparation, planting, fertilizing, irrigation, harvesting, and other activities. The energy requirements of industrial activity in food production, such as fertilizer manufacture, are well known and considered as inputs into the food production system. The energy requirements and the protein yield are then related to the land area utilized for each method of production.

The data resulting from this study indicate that most unconventional sources of protein require large energy inputs. For the industrialized nations this requirement is not important provided energy is freely available. For the developing nations, energy requirements for food production are a substantial portion of the total national energy budget, and unconventional sources of protein are unnecessarily expensive. Developing nations could put energy to better use by stimulating their agricultural enterprise.

The author believes that the method of relating energy input to protein production and land area is valuable in food production policy planning.
[4 figures, 3 tables, 98 references]

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Anonymous

Organisation for Economic Co-operation and Development, 2, rue André-Pascal, 75775 Paris, CEDEX 16, France (1973), 247 pp. Price $5.00, £1.76, F20, DM 12.50.

The organisation for Economic Cooperation and Development (OECD) was set up under a convention signed in Paris on Dec. 14, 1960 to promote the economic well being of the member states. The members of OECD are 18 countries in western Europe, Turkey, Australia, New Zealand, Japan, Canada, and the United States. This review was prepared by the Committee for Fisheries of OECD, and it covers the fisheries developments in 20 member countries in 1972. Included is a review of the 5 years from 1967 to 1971.

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9.2 (9.16)

stituents, and oxygen content. Damage due to wind and wave of hurricane activity makes the aquaculture enterprise vulnerable. Insurance against this risk can mitigate the costs of any damage that may occur.

In the realm of social and economic affairs, the appropriate location of many aquaculture operations may be in the tropics. The condition of government in the countries in these latitudes brings up questions of political stability, the economic strength of the society, the structure of business patterns, and the concept of land ownership. (The author believes that labor unrest will not constitute a risk to an aquaculture venture in the Middle Americas.) Other risks may relate to poaching, sources and prices of feed, and changes in the market for the finished product.

SW

9.3 RESEARCH AND THE LAW OF THE SEA

Anonymous

Endeavour 32, No. 119, 50 (1973)

Aquatic Sciences & Fisheries Abstracts 3, No. 9, 2, Abstract No. 3Q9149M (Sept. 1973)

The activities of research and exploitation and scientific research in the sea may well be governed by various U.N. dispositions [unintelligible] concerning the Law of the Sea conference. No conclusions among delegates are discussed. The forthcoming conference is to be solved. The problems which may be encountered in the future are likely to be of a technical nature.

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Anonymous

Endeavour 32, No. 119, 50 (1973)

Aquatic Sciences & Fisheries Abstracts 3, No. 9, 2, Abstract No. 3Q9149M (Sept. 1973)

quantity of those from any other country but have fallen considerably since 1966. Taiwan, South Korea and Peru are other important exporters. Exports from Taiwan and South Korea have been rising rapidly. In 1969 total exports of canned tuna were 89 000 tons (£19.5 million). Of these 64 000 tons were from Japan. Between 1960 and 1969 Japan's exports rose each year, with the exception of 1965, and she increased her share of world exports from nearly a half to over 70 percent. No other country exports more than 10 000 tons. The trend of canned exports is slightly upwards.

The most important markets for raw tuna are the USA, Italy and Japan. In 1969 their respective imports were 142 000 tons, 48 000 tons and 35 000 tons. Total imports were 256 000 tons (£44.7 million). The USA is also the biggest importer of canned tuna and in 1969 her imports were 34 000 tons of total world imports of 84 000 tons. Other notable importers of canned tuna are the countries of the European Economic Community (excluding the Netherlands), the United Kingdom and Switzerland. The market prospects for new suppliers are thought to be good in nearly all markets if they can provide their product at a competitive price. Of the various tuna species skipjack are thought to have the greatest potential.

The finding of high levels of methyl mercury in some tins of canned tuna in the USA at the end of 1970 resulted in temporary consumer resistance to the product. This appears to have ended with the findings of governmental investigations. A number of countries have set up tolerance levels for the mercury content of imported fish and imports exceeding these limits are to be rejected. The largest single influence on the price of tuna, apart from the size of the catch is the state of the market in the USA. The main factor affecting the market for tuna in the future is likely to be the size of the world catch.
[9 diagrams, 12 tables in text, 26 tables in appendix A, 7 references, and a bibliography of 24 references]

Authors' summary in part

9.2

Anonymous

Organisation for Economic Co-operation and Development, 2, rue André-Pascal, 75775 Paris, CEDEX 16, France (1973), 247 pp. Price $5.00, £1.76, F20, DM 12.50.

The organisation for Economic Cooperation and Development (OECD) was set up under a convention signed in Paris on Dec. 14, 1960 to promote the economic well being of the member states. The members of OECD are 18 countries in western Europe, Turkey, Australia, New Zealand, Japan, Canada, and the United States. This review was prepared by the Committee for Fisheries of OECD, and it covers the fisheries developments in 20 member countries in 1972. Included is a review of the 5 years from 1967 to 1971.

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9.2 REVIEW OF FISHERIES IN OECD MEMBER COUNTRIES 1972

9.2 (9.3) FISHERMAN QUOTAS: A TENTATIVE SUGGESTION FOR DOMESTIC MANAGEMENT

Christy, Francis T., Jr. (Resources for the Future, Inc., Washington, D.C.)
Occasional Paper No. 19, Law of the Sea Institute, University of Rhode Island, Kingston, RI 02881 (Nov. 1973), 7 pp.

This paper describes a system of "fisherman quotas" as an aid in the management of the domestic fisheries. The author indicates that his discussion is only preliminary, tentative, and speculative. By the system, each fisherman would be allocated a share of the yield of the fishery, expressed as a percentage of the total catch. The fisherman would be the boat owner; other definitions might also be considered such as nonowning boat captain. Certain regulations might be employed within the system to help conserve the fishery stock and to prevent certain conflicts. For example, there might be limitations on the size of fish caught, prohibitions against the use of destructive gear, or arrangements to prevent gear conflicts. Within these conservation restraints, the fishermen quota holders would be free to use any kind of vessel, gear, or technique to harvest the stock. The license fee would be proportionate to the size of the quota. Other provisions were suggested that might characterize the nature of the approach.

The proposed system for domestic fishery management has the advantages of flexibility and the freedom it gives to the fisherman to innovate. It might also permit reductions in the cost of fishery management. The author suggests that the system of fisherman quotas may merit further consideration. FTP

9.3 (9.2) SHORELINES MANAGEMENT: THE WASHINGTON EXPERIENCE

Anonymous
Report No. WSG-AS73-4, Proceedings of a Symposium sponsored by the State of Washington, the City of Seattle, and the American Bar Association. Distributed by the University of Washington Press, Seattle, WA 98195 (1972), 184 pp. Price $5.00.

This report of the proceedings of a Symposium held in Seattle, June 24, 1972, contains the following:

Welcoming Remarks;
The Need for Shorelines Management;
The Legal Background for Coastal Zone Management;
A Summary of the Washington Act--Legislative History;
The Magnuson Coastal Zone Management Act;
Administering the Washington Act;
Alternative Strategies for Shorelines Management;
What's Right and What's Wrong With the Washington Act;
Allocating Coastal Resources;
Appendix A: Shoreline Management Act of 1971;
Appendix B: Department of Ecology Guidelines.

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9.2 AN EVALUATION OF A PROPOSED SOLUTION FOR THE MARINE INSURANCE PROBLEMS OF THE TEXAS SHRIMPING INDUSTRY

Etter, Wayne E. (Dept. of Finance, Texas A. & M. University)
Publication No. TAMU-SG-74-202, Dept. of Marine Resources Information, Center for Marine Resources, Texas A. & M. University, College Station, TX 77843 (Aug. 1972), 41 pp. Price $2.00.

Two major insurance problems facing Texas shrimp boat operators concern the availability of insurance and the premium rate at which insurance can be obtained. The industry, in an attempt to resolve the problems, considered two approaches: the first called for an industry-owned company (captive) and the second was to obtain group insurance from an existing insurer. The author was charged with the responsibility for analyzing the two approaches. With the cooperation of the Texas Shrimp Association, and by means of a questionnaire, the following information for the 5-year period 1966-1971 was obtained for both steel and wooden shrimp fishing vessels: (1) type of hull (steel or wooden), (2) total agreed valuation of all insured vessels in the operator's fleet, (3) agreed valuation of insured vessel in fleet with lowest valuation, (4) agreed valuation of insured vessel in fleet with highest valuation, (5) average premium rate for fleet, (6) deductible amount, (7) total premium paid, and (8) major cause of losses.

Both the "captive" insurance company approach (industry-owned) and the group insurance (from an existing insurer) appeared feasible; each plan provided a method of selecting out the poorer risks [or conversely of upgrading the safety standards] through the establishment and enforcement of minimum underwriting

9.3 (9.2) NATURAL RESOURCES MANAGEMENT IN THE GREAT LAKES

Burkholder, James Arthur (Cornell University, Ithaca, New York)
Great Lakes Management Problems Series, New York State Sea Grant Program, 99 Washington Ave., Albany, NY 12210 (May 1973), 172 pp.

The Water Resources and Marine Sciences Center, Cornell University, has been engaged in a series of studies of the institutional problems in the Great Lakes Basin. One conclusion of these studies was that the present institutional structure for resource management in the Great Lakes Basin is inadequate and is in need of fundamental revision. In one report of these studies, it was concluded that the improved management of Lake Ontario, and by extension all the Great Lakes, would require either a substantial strengthening of the International Joint Commission or the establishment of an altogether new binational agency to supplant the former in the Great Lakes Basin. [The Boundary Waters Treaty of Jan. 11, 1909, between the United States and Canada provided for the International Joint Commission.] The purpose of the present paper was to describe the Basin-wide (international) Great Lakes resources management situation and to identify a course of action to improve management of this great common natural resource--the Great Lakes System. The introductory chapter is a discussion of the level of development and the present conditions in the Great Lakes. In chapter 2, the present conditions are identified; the author suggests that recommendations calling for reorientation of existing institutions and/or development of new institutional concepts for resource management in the Basin merit consideration. The third

9.2

rules pertaining to safety and operating standards. Although the operators preferred the captive insurance group plan, the financial requirements to capitalize the corporation seemed prohibitive. The group insurance plan then appeared to be the favored alternative. Both plans are described and evaluated in this report. Lists of the underwriting rules and the safety insuring standards are given. [2 figures, 8 tables, 22 footnotes, 1 appendix] FTP

9.3 LOCAL IMPACTS OF THE LAW OF THE SEA

Anonymous
Report No. WSG-AS73-8, Proceedings of a Conference, Division of Marine Resources, University of Washington, Seattle, WA 98195 (Aug. 1973), 141 pp. Price $5.00

This conference arose from a suggestion involving three main areas of concern: (1) The resolution in 1970 of the United Nations General Assembly to convene a global conference on the law of the sea, (2) Recommendations of the U.N. conference must be adopted by this nation if the negotiations are not to end up as an exercise in futility, and (3) The many problems of world society now call for global arrangements to deal with them. The report is divided into four main sections. The first section contains the opening address by Arvid Pardo, former Ambassador to the U.N. from Malta. The second section deals with fisheries uses of the sea; the third deals with oil and hard minerals; and the last contains an overview of the conference by Edward Wenk, University of Washington. FTP

9.2 TECHNOLOGY AND THE MANAGEMENT OF CHANGE FROM THE PERSPECTIVE OF A CULTURE CONTEXT

Michael, Donald N. (Center for Research on the Utilization of Scientific Knowledge, University of Michigan)
Technological Forecasting and Social Change 5, No. 3, 219-232 (1973)

In this essay, the author first discusses some culture characteristics that have encouraged technological developments in the United States. Then he examines some kinds of behaviors and institutional arrangements that support, thus reinforce, these culture characteristics. Third, he considers the management of change in terms of the negative and positive consequences of the persisting culture pattern. Finally, he discusses the consequences anticipated in the future: the inevitability of social turbulence as a source of change leading to new culture forms with a differing value of technology, and the different behaviors and institutions for facilitating these values which will result from this process. Because of the apparent inevitability of this social turbulence, guiding social change to a different, appropriate valuing of technology (with corresponding changes in behavior and institutions) will require the development of social theory and technologies far beyond those presently available. The chances of succeeding appear slight. [8 notes and references] FTP

9.3 (9.2)

chapter contains a brief review of the institutional options for comprehensive resource management for the international Basin. The fourth chapter is a discussion and assessment of the International Joint Commission. The last chapter is a description of a two-phase plan for creating a comprehensive natural resources arrangement within the International Joint Commission framework. FTP

9.3 INVESTIGATIONS OF COMMERCIALLY IMPORTANT PENAEID SHRIMP (1.85)(1.0117) IN LOUISIANA ESTUARIES

Gaidry, Wilson, J., III, and Charles J. White
Technical Bulletin No. 8, Louisiana Wild Life and Fisheries Commission, Oysters, Water Bottoms and Seafoods Division, New Orleans, La. (Mar. 1973), 154 pp.

The purpose of this study was to obtain data that would be useful in improving the fishery management of Louisiana shrimp. Data were obtained on penaeid shrimp recruitment, growth, and movement. These data were related to the hydrological conditions in the estuarine systems of the coast of Louisiana. Also, information was presented on the relation between the hydrological conditions and the production of penaeid shrimp. The report also contains a discussion of Louisiana's shrimp management programs and includes recommendations for the management of the shrimp fisheries.
[8 figures, 29 tables, 76 references] FTP

9.3 NEW PERSPECTIVES ON INTERNATIONAL ENVIRONMENTAL LAW
(9.8)

Anonymous
Yale Law Journal 82, No. 8, 1659-1680 (July 1973)

In 1972 the United Nations Conference on the Human Environment (Stockholm, Sweden) attempted to clarify the obligations of states to protect the environment of the entire planet and to develop institutions capable of focusing and pursuing those concerns. [Report of the United Nations Conference on the Human Environment, U.N. Document A/Conf. 48/14 (1972).] In the present note, a basic conceptual framework is suggested and it is used to assess both the adequacy of the existing legal order and of the means of improving the prescription and application of international environmental law. ["Prescription" is the crystallization of general policies in continuing community relations. "Application" is the final characterization of concrete circumstances according to prescriptions, the enforcement of principles in practice.] From the analysis presented in this study, two conclusions evolved. First, in the prescription of international environmental law, multilateral initiatives aimed at reducing the state-centeredness and increasing the environmental responsiveness of the legal order are developing and deserve encouragement. However, these initiatives must be supplemented by the concurrent adoption of sound ecological principles by national political processes. Secondly, it is hoped that multilateral action, in its application, at the global and regional level will be the long-term solution. The most immediately promising course for achieving environmental protection is the assumption by individual states of the responsibilities for implementing collectively derived prescriptions. In the absence of these prescriptions the individual states should operate under reasonable unilateral standards to achieve environmental protection. [89 footnotes] FTP

9.3 FISHERIES ISSUES IN THE YELLOW SEA AND THE EAST CHINA SEA

Park, Choon-ho
Occasional Paper No. 18, Law of the Sea Institute, University of Rhode Island, Kingston, RI 02881 (Sept. 1973), 35 pp.

The Yellow Sea and the East China Sea are semienclosed by the lands of China, Japan, and Korea. These shallow and fertile seas are good fishing areas for coastal and offshore fisheries. Legal problems involving the law of the sea are created by the natural facts of geography, and political relations have not been conducive to joint management of the fisheries. Although the seas have retained their productivity, the author indicates that inequities in the harvest exist. Four treaties now exist that are intended to regulate the fisheries in the Yellow Sea and the East China Sea, but none of them is binding on all the coastal states. The author believes that the fisheries resources of these seas are subject to overexploitation and further that these resources are vulnerable to external factors (such as pollution by oil). He suggests that the leaders of the coastal states should realize the importance of regional arrangements to help retain the productivity of these seas; furthermore, such regional arrangements might lead to cooperative efforts in other aspects of international affairs.
[90 footnotes, 2 maps] FTP

9.3 (9.19) THE ROLE OF UNILATERAL STATE ACTION IN PREVENTING INTERNATIONAL ENVIRONMENTAL INJURY

Bilder, Richard B. (University of Wisconsin, Madison, WI 53706)
Sea Grant Technical Report WIS-SG-73-219, Sea Grant Communications Office, 1225 W. Dayton St., Madison, WI 53706 (Sept. 1973), v + 59 pp.

This paper is an analysis of unilateral environmental action with respect to questions such as (1) What types of unilateral environmental action are states presently taking or likely to take, particularly in order to deal with problems of transnational environmental injury? (2) To what extent does unilateral action raise problems under existing international law? and (3) What are the potential advantages and disadvantages of unilateral action in terms of its possible effects on transnational environmental problems, international relations and trade, and on the future development of international law? For the purpose of the author's discussion, unilateral action was defined as any action which a state takes solely on its own, independent of any express cooperative arrangement with any other state or international institution. The various sections include (1) Types of unilateral state actions: some distinctions, (2) The legality of unilateral action by a state to protect itself from environmental injury, (3) The legality of unilateral action by a state to protect community environmental concerns: The concept of custodial protection, (4) The effects of unilateral state action, (5) Accommodating individual state action within a multilateral framework, and (6) A tentative assessment.

The analysis suggests that unilateral state action to prevent international environmental injury is likely to play an important and continuing role in efforts

9.7 MARINE AFFAIRS AND HIGHER EDUCATION

Mangone, Gerard J., and John L. Pedrick, Jr.
Report No. DEL-SG-17-73, College of Marine Studies, University of Delaware, Newark, DE 19711 (Sept. 1973), 223 pp. Price $5.00.

Marine affairs involves the application of history, law, political science, economics, and other social disciplines to the use of the oceans, the seabed, and the coastal zone. This area of study is rapidly developing today in American higher education. Marine affairs has largely dealt with legal problems and matters because of the interest in marine sciences in the early 1960's, the establishment of the Sea Grant Program in 1966, and the activities relating to the Law of the Sea Conference in 1973-74. The number of political science, public administration, and economics courses dealing with the oceans, the seabed, and the coastal zone have greatly increased in most marine affairs curricula, but history, sociology, and anthropology are still inadequately covered. Degrees in marine affairs are offered in six American law schools and five other graduate schools, and nondegree marine affairs programs are offered in at least seven other institutions. Because of the limited professional opportunities in this area, the future of marine affairs study will depend upon the continuance of faculty-student intellectual interest and the renewal of funds by public agencies and private institutions. Most likely marine affairs study will settle down to several large institutions willing to make long-term commitments to this area while providing a full-scale and complimentary program in marine science.

This report contains a discussion of marine science affairs and higher education and four appendixes dealing with (1) Survey statistics, (2) Marine affairs

9.8 (9.19) EFFECTS OF TROPICAL STORM AGNES ON EPIFAUNAL INVERTEBRATES IN VIRGINIA ESTUARIES

Andrews, Jay D. (Virginia Institute of Marine Science, Gloucester Point, VA 23062)
Chesapeake Science 14, No. 4, 223-234 (Dec. 1973)

The low-salinity regimes in Chesapeake Bay that followed the passage of Tropical Storm Agnes produced unprecedented changes in distributions and abundances of estuarine biota. After the initial surge of fresh water from the Virginia river basins, a second larger flow from the Susquehanna River basin cut off supplies of salt water from the Chesapeake Bay and ocean sumps. This later surge prolonged epifaunal exposure to low salinities of 10 ‰ to 9 days at the mouth of the James River and about 50 days in the Rappahannock River.

The lower sectors of the Virginia rivers, where mesohaline species normally live, were most affected. Oligohaline species such as oysters, barnacles, and hooked mussels were severely stressed and many individuals died, but eradication did not occur. Mesohaline species including all sponges, tunicates, echinoderms, many mollusks, and many predators and scavengers, oyster drills, spider crabs, etc., were eliminated from large areas including whole rivers. Recovery of some species, e.g. sea squirts and red sponge, is progressing rapidly but others, colonial tunicates, yellow sponges, oyster drills, etc., may require years. The slowest will be those without pelagic larvae, and those where breeding populations were greatly reduced or eliminated. Oyster drills are an important example.

This report begins with a description of established communities and follows changes of faunal groups due to freshwater and low-salinity exposure. After the

9.3 (9.19)

to deal with such problems. Although multilateral actions seem preferable generally to unilateral actions, effective multilateral arrangements may be practically unattainable in certain cases. Thus, unilateral action may be the only feasible alternative to inaction. The desirability and effectiveness of unilateral state action for dealing with international environmental problems will depend upon such factors as the nature of the environmental problem, the type of measures taken, the way the measures are applied, the benefits and costs to the acting state and the international community, and the alternatives available.

Also, the analysis suggests that there are many approaches to resolving international environmental problems depending upon the particular circumstances. These approaches range from recognition of broad state discretion to the provision of a strong and exclusive international regulatory authority. A comprehensive and effective system of international control will require an imaginative and realistic mix of all elements within this wide spectrum of approaches.

[108 footnotes]

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9.19 CHARACTERIZATION AND IDENTIFICATION OF SPILLED RESIDUAL FUEL OILS BY GAS CHROMATOGRAPHY AND INFRARED SPECTROPHOTOMETRY

Kawahara, F. K. (Natl. Environ. Res. Cent., U.S. Environ. Prot. Agency, Cincinnati, Ohio)
Chemical Abstracts 79, No. 18, 106609b (Nov. 5, 1973)

9.3 (9.2)

9.19 FISH MORTALITY CAUSED BY AMMONIA AND HYDROGEN SULFIDE

Vamos, R., and R. Tasnadi (Inst. Plant Physiol. Microbiol., Univ. Szeged, Szeged, Hungary)
Chemical Abstracts 79, No. 16, 96556r (Oct. 22, 1973)

9.3 (9.2) ALASKA AND THE LAW OF THE SEA.
NATIONAL PATTERNS AND TRENDS OF FISHERY DEVELOPMENT IN THE NORTH PACIFIC

Buck, Eugene H.
Alaska Sea Grant Report No. 73-4, Arctic Environmental Information and Data Center, University of Alaska, 142 E. Third Ave., Anchorage, AK 99501 (Oct. 1973), 65 pp. Price $3.00.

This report contains comprehensive summaries of data on certain commercial fisheries of Alaska. It covers those stocks of fish (shrimp, tanner crab, king crab, herring, pink salmon, coho salmon, chinook salmon, chum salmon, sockeye salmon, pollock, Pacific cod, Pacific ocean perch, blackcod, halibut, and flatfish) that require close attention in their management because they are harvested by fishermen of many nations and because of the resulting difficulty in reaching mutually agreeable regulations that are capable of maintaining the exploited stocks at their most productive levels. The data are presented by species and contain information on annual catches, relative importance of various fishing districts, and division of the catches among the nations (United States, Japan, U.S.S.R., and Canada) participating in the fishery.

[25 references]

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9.7 (9.6) RESEARCH METHODS IN MARINE BIOLOGY

Schlieper, Carl (editor)
University of Washington Press, Seattle (1972), xiii + 356 pp. $12.50.
Robert W. Pennak (reviewer)
Transactions of the American Fisheries Society 102, No. 4, 854-855 (Oct. 1973)

This book was originally published in German in 1968. It was translated by Elizabeth Drucker and published again in 1972. The various sections of the book were written by 17 German specialists; it is a collection of selected basic techniques for students and beginning investigators. There are sections on chemical, physical, and biological methods. There are additional sections on stock analysis, underwater observations and photography, laboratory culture, ecological physiology, and productivity studies. The reviewer believes that the book will have wide appeal but serious omissions and excessively brief descriptions of methods limit its usefulness in the laboratory.

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9.8 (9.19)

initial mortalities, open niches were quickly colonized by opportunistic species, thereby initiating new estuarine successions for continuing observations.
[1 figure, 2 tables, 16 references] Author's abstract in part

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degree-granting institutions and other universities offering marine affairs courses, (3) Partial list of faculty teaching marine affairs, and (4) Outlines and readings of courses in marine affairs.

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9.2 (9.6) TECHNOLOGICAL FORECASTING FOR DECISIONMAKING

Martino, Joseph P. (United States Airforce)
American Elsevier Publishing Co., Inc., New York, NY 10017 (1972), 768 pp. Price $30.00.
Harold A. Linstone (Futures Research Institute, Portland State University, Portland, OR 97207) (reviewer)
Technological Forecasting and Social Change 5, No. 3, 321-325 (1973)

The reviewer recommends this book for serious graduate level courses in technological forecasting for both business and engineering schools as well as for independent study. The material is presented in an orderly and lucid fashion. The first nine chapters cover technological forecasting technology, the next six chapters are on planning, and the rest cover the role of technological forecasting in business, government, and social areas. FTP

9.3 (1.013) [MARITIME AND FISHERIES LEGISLATION CURRENT IN CHILE] LEGISLACIÓN MARITIMA Y PESQUERA VIGENTE DE CHILE

Anonymous
Comisión Permanente del Pacifico Sur, Chile, Equador, Peru. Quito (1972), 159 pp. (In Spanish) (Com. Perm. Pac. Sur, Urritia 181, Apart. Post. 261A, Quito, Ecuador)
Aquatic Sciences & Fisheries Abstracts 3, No. 9, Abstract No. 3Q9136M, 1 (Sept. 1973)

The Secretary General of the Permanent Commission for the South Pacific published in 1968 a compilation of fisheries legislation current in Chile, Ecuador, and Peru. Because there have been many changes in this type of legislation in the three countries since 1968, the compilation has been revised. The revision may lead to uniformity in future national legislation in these countries. The revised volume on Chile is divided into five sections: (1) regulations for maritime jurisdiction, (2) rules for maritime commercial legislation, (3) rules for regulation of fisheries, (4) regulations on taxation, and (5) rules relating to state services. This volume will be followed by compilations of legislation from Ecuador and Peru. SW

9.4 REPORT OF THE NATIONAL MARINE FISHERIES SERVICE FOR THE CALENDAR YEARS 1970 AND 1971

Anonymous
U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Washington, DC 20230 (Sept. 1973), 131 pp.

This report describes the state of the U.S. fisheries in 1970-71, the present organization of the National Marine Fisheries Service (NMFS), the tools that the NMFS has to accomplish the tasks assigned, and the significant activities during 1970 and 1971 of the NMFS and its predecessor organization the Bureau of Commercial Fisheries; it also lists the publications (1,068 titles) which have resulted from the functions of the NMFS during the period. FTP

9.7 (9.6) A BIBLIOGRAPHY OF ELEMENTARY AND SECONDARY MARINE SCIENCE CURRICULUM PROJECTS AND EDUCATIONAL MATERIALS

Morgan, Myra J.
Marine Bulletin Series No. 15, University of Rhode Island, Kingston, RI 02882 (1973), 23 pp. Price $0.50.

This annotated bibliography lists marine science curriculum projects and other educational materials. It is arranged in a concise form of value to elementary and secondary school teachers throughout the United States. The entries listed concern only curriculum projects and materials designed for use in the classroom, indoor or outdoor. The complete addresses of all sources are listed in the appendix. FTP

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